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THE DIAGNOSIS OF TYPHOID FEVER BY THE ISOLATION OF THE ORGANISM

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Since a positive diagnosis of typhoid fever rests upon the isolation of *Salmonella typhi*, methods of isolating this organism in the laboratory are worth discussing more fully. Although serology and autopsy reports may also be helpful, these procedures are not considered in this paper, which deals only with the diagnosis of clinical typhoid fever by bacteriological methods.

ISOLATION FROM BLOOD

This remains the method of choice in establishing an early diagnosis of *S. typhi* infection,^{10, 11, 15, 17} but contrary to other opinions,^{3, 15} Watson¹⁷ considers that blood cultures still remain the method of choice even late in the disease. Moreover, by using suitable methods of culture, it has been shown that previous TAB inoculations or antibiotic therapy do not interfere with such isolations.^{11, 17}

Although there are many variations in methods of sampling blood for culture of *S. typhi*, the Wentworth laboratory uses a standard technique for blood cultures and for clot cultures as recommended by Watson and Laurie.¹⁸ Cultures from bone marrow are not made by this laboratory and consequently we have no experience of their value in the diagnosis of this condition.

It can be seen from Table I that there is an increase in the number of positive cultures when both whole blood and clot cultures are made in the same patients.

TABLE I. *S. TYPHI* ISOLATED FROM BLOOD AND FROM CLOT CULTURES

Series	Clot culture positive Blood culture positive	Clot culture positive Blood culture negative	Clot culture negative Blood culture positive	Total cases
Felix ³	29	2	0	31
Watson ¹⁷	57	11	3	71
Watson and Laurie ¹⁸	96	69	17	182
Wentworth	62	54	0	116

The time interval between taking the samples and receiving the samples for culture in the laboratory is shown in Table II.

TABLE II. ISOLATION OF *S. TYPHI* (WENTWORTH SERIES)

Time before examination (days)	Clot culture positive Blood culture positive	Clot culture positive Blood culture negative	Total isolations
2	31	20	51
3	13	17	30
4	15	12	27
5	1	3	4
6	2	1	3
7	0	1	1

Contrary to the findings of other investigators,^{14, 15} viable organisms can still be recovered from the clot, even when the infected clot and serum remain in contact for long intervals at a relatively high temperature. It does not seem to be important, therefore, that the clot should be separated quickly from its serum. Since organisms may be relatively scanty, both clot and whole-blood cultures should be made in order to obtain the best chance of isolating the organisms. However, organisms may still be isolated from very small blood samples, and dried bacterial cultures have been successfully transported by post.^{5, 10} The transport of clot cultures or dried products of clot cultures therefore becomes a practical proposition, even when immediate laboratory facilities are non-existent.

ISOLATION FROM EXCRETA

For various reasons, organisms may not be obtained from repeated blood cultures, so that urine and stool examinations are important means of establishing a bacteriological diagnosis of typhoid fever (Table III). Such examinations are also necessary for the diagnosis of 'carriers' of *S. typhi*, and may also be of importance in discovering the so-called symptomless excretors and those patients whose symptoms of active disease are minimal.^{7, 12}

TABLE III. *S. TYPHI* ISOLATED FROM URINE AND STOOL CULTURES

Series	Isolations from urine/stools	Total isolations	% missed blood cultures
Leishman ⁸	1,235	2,318	53.3
Felix ⁴	4	90	4.4
Lewin ⁹	47	229	20
Stuart and Pullen ¹³	95	357	26.6
Anderson and Richards ¹	43	105	41
Shaw and Mackay ¹¹	10	49	20.4
Jones ⁷	19	135	14
Watson and Laurie ¹⁸	8	209	3.8

As the alertness of the clinician increases and bacteriological methods produce more positive results from blood cultures, the isolation of *S. typhi* from excreta becomes important mainly from a public-health point of view. The laboratory, given suitable material from patients, can confirm the majority of overt typhoid cases by cultural methods (Table IV). Emphasis should therefore be placed on blood examinations rather than examinations of excreta later on in the disease.

TABLE IV

Series	No. diagnosed as enteric fever	Total cases where <i>S. typhi</i> was isolated	Comments
Felix ³	47	28	19 clinical cases.
Stuart and Pullen ¹³	359	357	2 confirmed by autopsy.
Jones ⁷	116	135	19 symptomless excretors.
Watson and Laurie ¹⁸	227	209	1 chronic carrier. 17 clinical cases. 1 salmonellosis.

With the advent of specific antibiotic therapy, the possibility of isolation of *S. typhi* from stools or urines has diminished and the importance of blood cultures has correspondingly increased.

DISCUSSION

In South Africa the incidence of typhoid fever is decreasing in urban areas. It still remains a common disease in rural and Native areas, and the carrier rate has been estimated to be high among Natives.^{2,6} It is most unlikely that the Wentworth series represents a true picture of the epidemiology of this disease, since mild clinical cases and symptomless excretors from endemic areas may never even be investigated bacteriologically.

Very mild cases and symptomless excretors of *S. typhi* may be extremely difficult to discover by the bacteriological laboratory,⁷ but unless active measures are taken to discover all excretors of the organism the disease will continue to be endemic in these primitive communities. The overt case of typhoid fever from endemic areas therefore should be considered as an indication for an intensive bacteriological investigation of all personnel who may have been infected

from the same source. However, this may be a counsel of perfection and quite impractical to enforce among large communities where typhoid is endemic. In communities where typhoid occurs mainly in a sporadic or epidemic form, such public health measures are essential in order to avert the spread of typhoid by excretors and to avoid the possibility of forming an endemic area of this disease. Under such conditions the use of the overt clinical case as an indicator for widespread bacteriological investigations is quite practical.

SUMMARY

A brief review is made of the means of diagnosing typhoid fever by routine laboratory procedures, with mention of the techniques usually employed by the Wentworth laboratory.

As the clinical acumen of medical officers increases, the importance of blood cultures likewise increases, and there will be a corresponding diminution in the value of stool or urine examinations in order to establish the diagnosis of typhoid fever.

The despatch of blood for bacteriological cultures and the feasibility of using a centralized laboratory service is stressed, even when laboratory facilities are not available on the spot.

A short discussion is given on the importance to be attached to a diagnosis of typhoid fever in relation to possible contacts in endemic and non-endemic areas.

I wish to thank Dr. H. D. Tonking, Provincial Pathologist, Natal, for permission to publish this article, and Mr. J. R. Hart for help and advice.

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Suid-Afrikaanse Tydskrif vir Geneeskunde

South African Medical Journal

VAN DIE REDAKSIE

POLIOMIELITIS-ENTSTOF—AMERIKAANSE, BRITSE EN SUID-AFRIKAANSE

Verdere inligting is onlangs vrygestel oor die praktiese aanwending en doeltreffendheid van beskermende inenting met die geformaliseerde poliomiëlitis-entstof soos dit in die Verenigde State, in Brittanje en in Suid-Afrika vervaardig word. Verlede week is 'n artikel deur F. K. Mitchell¹ oor poliomiëlitis-inenting in die Afdeling Kaapstad, in hierdie Tydskrif gepubliseer; en hierdie week (bls. 704 en 705) publiseer ons uittreksels uit die verslag deur die Poliomiëlitis-Entstofkomitee van die Mediese Navorsingsraad² oor die beraming van die Britse entstof wat in die *British Medical Journal* verskyn het, en uit die verslag oor poliomiëlitis-beheer in die Verenigde State gedurende 1956 deur die Poliomiëlitis-Voorsorgseenheid, soos in *Public Health Reports*, Washington, gepubliseer.

DIE BRITSE ENTSTOF

Die Britse geformaliseerde entstof word nou in die VK vir algemene immunisering teen verlamende poliomiëlitis gebruik. Soortgelyk aan die Suid-Afrikaanse entstof, bevat dit dieselfde bestanddele as die Amerikaanse (Salk) entstof, behalwe dat die Brunenders-virus, tipe-I i.p.v. die sterker Mahoney-soort, tipe-I gebruik word.

Byna 150,000 kinders in die VK is vir die beraming gebruik (helfte van hulle was 1½-5½ jaar en helfte 5½-9½ jaar oud). In Mei en Junie 1956 het al hierdie kinders 2 inspuitings, met 'n tussenpose van nie korter as 3 weke nie, gekry. Die voorkoms van poliomiëlitis tussen 1 Julie 1956 en 31 Januarie 1957 by hierdie ingeënte kinders, is met die voorkoms daarvan by oningeënte kinders van dieselfde ouderdomsgroepe vergelyk. By die jonger groep is dit gevind dat die aantastingsgraad van verlamende poliomiëlitis, per 100,000, 20·1 by die oningeëntes en 4·1 by die ingeëntes was, terwyl dit by die ouer groep 8·2 by die oningeëntes en 1·3 (een enkele geval) by die ingeëntes was. Dus was die voorkoms van verlamende poliomiëlitis by die ingeëntes in beide ouderdomsgroepe ongeveer een-vyfde van dié by die oningeëntes; d.i. die waarskynlike beskerming wat die entstof gebied het, was ongeveer 80%. Dit skyn nie of die voorkoms van die siektes wat as nie-verlamende poliomiëlitis aangegee is, deur die inenting beïnvloed is nie.

Hierdie resultate stem goed ooreen met dié wat by die 1954-VSA-veldtoets verkry is, waar die aantastingsgraad van verlamende poliomiëlitis by kinders (hoofsaaklik 6-9 jaar oud), wat 3 toedienings van die Salk-entstof per inspuiting gekry het (met tussenposes van 'n week en 'n maand), 28% was van dié by kinders aan wie placebo-inspuitings gegee is, d.i. die skynbare beskerming was 72%;

13 Julie 1957

EDITORIAL

POLIOMYELITIS VACCINE—AMERICAN, BRITISH AND SOUTH AFRICAN

Further information has recently been made available concerning the practical application and effectiveness of protective inoculation with the formalized poliomyelitis vaccine as produced in the United States, in Britain and in South Africa. Last week an article by F. K. Mitchell¹ was published in this *Journal* on poliomyelitis vaccination in the Cape Division; and this week (pp. 704 and 705) we publish abstracts of the report on the assessment of the British vaccine by the Poliomyelitis Vaccines Committee of the Medical Research Council² as published in the *British Medical Journal*, and on poliomyelitis control in the United States in 1956 by the Poliomyelitis Surveillance Unit of the US Public Health Service,³ published in *Public Health Reports*, Washington.

THE BRITISH VACCINE

The British formalized vaccine is now being used in the UK for general immunization against paralytic poliomyelitis. Like the South African vaccine, it contains the same constituents as the American (Salk) vaccine except for the substitution of the Brunenders type I virus in place of the more virulent type I Mahoney strain.

The assessment was made on nearly 150,000 children in the UK (half aged 1½-5½ years and half 5½-9½ years), who in May and June 1956 all received two injections separated by not less than 3 weeks. The incidence of poliomyelitis with onset between 1 July 1956 and 31 January 1957 in these vaccinated children was compared with the incidence in unvaccinated children of the same age-groups.

It was found that in the younger group the attack rate of paralytic poliomyelitis per 100,000 was 20·1 in the unvaccinated and 4·1 in the vaccinated, while in the older group it was 8·2 in the unvaccinated and 1·3 (one single case) in the vaccinated. Thus in both age-groups the incidence of paralytic poliomyelitis in the vaccinated was about one-fifth of the incidence in the unvaccinated; i.e. the apparent protection given by the vaccine was about 80%. The incidence of illnesses reported as non-paralytic poliomyelitis did not appear to be influenced by the vaccination.

These results conform well with those obtained at the 1954 United States field trial, where in children (mainly 6-9 years old) injected with 3 doses of the Salk vaccine (at intervals of a week and a month) the attack rate of paralytic

en geen noemenswaardige beskerming teen nie-verlammende poliomiëlitis is verleen nie.

Die navorsers se verslag lui dat daar geen bewys was dat die 400,000 inspuittings wat gedurende die Britse toets toegedien is, met enige gevaar gepaard gegaan het nie; plaaslike reaksies was van 'n ligte graad en van 6 gevalle van aangemelde poliomiëlitis wat binne 30 dae vanaf 'n inspuiting voorgekom het, was slegs 3 van 'n verlammende aard en by geeneen van hulle was die ingespuite ledemaat aangetas nie. In hierdie verband stem die bevinding weereens ooreen met die 1954-VSA-veldtoets.

DIE AMERIKAANSE (SALK) ENTSTOF

Sewentig miljoen dosisse Salk-geformaliseerde entstof is gedurende 1956 vir gebruik in die VSA uitgegee. Die verslag van die Poliomiëlitis-Voorsorgseenheid sluit nie 'n algemene statistiese berekening van die beskerming wat hierdie entstof bied, in nie, maar dit vermeld dat 'n aantal onafhanklike studies getrou dui op 'n 75%-vlak van doeltreffendheid by verhoeding van verlammende gevalle, met 'n groot gedeelte van die ingeënte bevolking wat minder as die aanbevole reeks van 3 dosisse ontvang het. Die verslag verskaf redes om te glo dat die maksimum doeltreffendheid van 3 dosisse, behoorlik versprei, nie 100% sal bereik nie. Die gevolgtrekking word ook gemaak dat die entstof wat tans gebruik word, minder doeltreffend is om nie-verlammende poliomiëlitis te verhoed.

Die verslag meld dat daar in 1956 min, indien enige, bewys van teenspoedige reaksies tot die VSA-entstof was, en dat die epidemiologiese bewyse daarop dui dat enige uitwerking wat veronderstel is om 'n aanval van poliomiëlitiese verlammings te veroorsaak, teen 'n graad van minder as 1 per 1,000,000 inentings voorgekom het.

Dus is die bevindinge van die Britse komitee met betrekking tot die veiligheid van die Britse entstof en sy vrywaringswaarde, nie alleen in ooreenstemming met die 1954-VSA-veldtoets nie, maar ook met die jongste bevindinge van die uitgebreide Amerikaanse program van beskermingsinentings met geformaliseerde poliomiëlitis-entstof.

DIE SUID-AFRIKAANSE ENTSTOF

Dr. Mitchell se ontleding van die resultate van die Afdelingsraad, Kaapstad se inentingsveldtog stel ons nou in staat om 'n skatting te maak van die beskermingswaarde en die veiligheid van die Suid-Afrikaanse entstof wat deur die Poliomiëlitis-Navorsingstigting, Johannesburg, vervaardig word. Niteenstaande die feit dat daar destyds poliomiëlitis in die distrik geheers het, en die algemeen-gehuldigde mening dat die veronderstelde gevare van inenting groter is wanneer die siekte heers, het dr. J. P. de Villiers, Mediese Gesondheidsbeampte van die Afdelingsraad, Kaapstad, besluit om 'n inentingsveldtog van stapel te stuur sodra voorrade van die entstof beskikbaar sou wees. Met die oog op 'n ernstige toename in die voorkoms van die siekte, is ongeveer 6,000 blanke kinders onder die ouderdom van 10, hoofsaaklik tussen Augustus 1956 en April 1957, ingeënt; ongeveer 5,000 van hulle het 'n tweede dosis, na 'n tussenpose van 6 weke, ontvang. Die 6,000 kinders wat ingeënt is, verteenwoordig ongeveer een-derde van die beraamde totale aantal blanke kinders onder 10 in die Afdeling, Kaapstad. Boonop is 3,600 nie-blanke kinders, hoofsaaklik in September 1955,

poliomyelitis was 28% of that in children given placebo injections, i.e. the apparent protection was 72%; and no significant protection was conferred against non-paralytic poliomyelitis.

The investigator's report that there was no evidence that the 400,000 injections given in the British trial had been accompanied by any risk; local reactions were mild and of 6 cases of notified poliomyelitis that occurred within 30 days of an injection only 3 were paralytic and in none of them was the injected limb involved. In this respect again the finding is the same as in the 1954 US field trial.

THE AMERICAN VACCINE

Seventy million doses of the Salk formalized vaccine was distributed during 1956 for use in the US. The report of the Poliomyelitis Surveillance Unit does not include a general statistical evaluation of the protection conferred by the vaccine, but it records that 'a number of independent studies consistently point to a level of effectiveness in preventing paralytic cases of 75%, with a large proportion of the vaccinated population having received less than the recommended course of 3 doses'. The report gives reasons for believing that the maximum effectiveness of 3 doses properly spread will not reach 100%. It also concludes that the vaccine is less effective in preventing non-paralytic poliomyelitis.

The report records that in 1956 there was slight, if any, evidence of untoward reactions to the US vaccine, and that the epidemiological evidence indicated that any hypothetical effect of provoking an attack of poliomyelitic paralysis occurred at a frequency of less than 1 per 1,000,000 inoculations.

Thus the findings of the British committee in regard to the safety of the British vaccine and its protecting value are in accord not only with the 1954 US field trial, but also with the latest conclusions from the vast American programme of protective inoculation with formalized poliomyelitis vaccine.

THE SOUTH AFRICAN VACCINE

Dr. Mitchell's analysis of the results of the Cape Divisional Council poliomyelitis vaccination campaign now enables an estimate to be made of the protecting value and the safety of the South African vaccine produced by the Poliomyelitis Research Foundation, Johannesburg. In spite of the prevalence of poliomyelitis in the district at the time, and the commonly held opinion that the supposed dangers of vaccination are greater when the disease is prevalent, Dr. J. P. de Villiers, Medical Officer of Health of the Cape Divisional Council, decided to promote a vaccination campaign as soon as supplies of the vaccine should be available. In the face of a steep rise in the incidence of the disease, about 6,000 European children under 10 years of age were inoculated, mostly between August 1956 and April 1957; about 5,000 of them received a second dose, after an interval of 6 weeks. The 6,000 children inoculated represented about one-third of the estimated total number of European children under

ingeënt, maar vir die twee Dr. Mitchell se ontleding van die resultate van die Afdelingsraad, Kaapstad se inentingsveldtog stel ons nou in staat om 'n skatting te maak van die beskermingswaarde en die veiligheid van die Suid-Afrikaanse entstof wat deur die Poliomiëlitis-Navorsingstigting, Johannesburg, vervaardig word. Niteenstaande die feit dat daar destyds poliomiëlitis in die distrik geheers het, en die algemeen-gehuldigde mening dat die veronderstelde gevare van inenting groter is wanneer die siekte heers, het dr. J. P. de Villiers, Mediese Gesondheidsbeampte van die Afdelingsraad, Kaapstad, besluit om 'n inentingsveldtog van stapel te stuur sodra voorrade van die entstof beskikbaar sou wees. Met die oog op 'n ernstige toename in die voorkoms van die siekte, is ongeveer 6,000 blanke kinders onder die ouderdom van 10, hoofsaaklik tussen Augustus 1956 en April 1957, ingeënt; ongeveer 5,000 van hulle het 'n tweede dosis, na 'n tussenpose van 6 weke, ontvang. Die 6,000 kinders wat ingeënt is, verteenwoordig ongeveer een-derde van die beraamde totale aantal blanke kinders onder 10 in die Afdeling, Kaapstad. Boonop is 3,600 nie-blanke kinders, hoofsaaklik in September 1955,

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Thus the findings of the British committee in regard to the safety of the British vaccine and its protecting value are in accord not only with the 1954 US field trial, but also with the latest conclusions from the vast American programme of protective inoculation with formalized poliomyelitis vaccine.

ingeënt, maar slegs ongeveer een-vierde van hulle het hulself vir die tweede toediening aangemeld.

Dr. Mitchell se verslag lui dat, terwyl 58 gevalle van poliomiëlitis vanaf 1 Januarie tot 31 Mei 1957 onder die oningeeëte blanke kinders onder 10 in die Afdeling, Kaapstad, aangemeld is (hulle getal word op 12,500 geskat), daar net 2 gevalle onder die 6,000 ingeeëte blanke kinders van daardie ouderdom voorgekom het. Die groot meerderheid van hierdie gevalle was verlammeende gevalle van poliomiëlitis. Soos uiteengesit as gevalle per 100,000 was die voorkoms van poliomiëlitis onder blanke kinders onder 10 gedurende hierdie epidemie-periode, dus 464 in die oningeeëte en 33 in die ingeeëte gevalle. Dit verteenwoordig 'n 90%-doeltreffendheidsvlak.

Wat veiligheid aanbetref, meld dr. Mitchell dat by nie een van die 15,700 inspuitings wat toegedien is, enige reaksie, wat redelikerwys aan die entstof toegeskryf kan word, voorgekom het nie, en dat daar hoegenaamd geen plaaslike en allergiese reaksies was nie. Slegs een kind is aangemeld met poliomiëlitis binne 30 dae vanaf die datum van inenting. Hierdie kind, 'n blanke seun van 9, is 10 dae na inenting aangemeld, en die redes word verskaf waarom die gevolgtrekking gemaak is dat die besmetting natuurlikerwys voorgekom het en dat die entstof nie daarvoor verantwoordelik was nie.

Die skrywer van hierdie ondersoek verklaar dat die gegewens nie 'veroorloof dat beproefde statistiese gevolgtrekkings gemaak kan word nie'. Nogtans is hulle baie opvallend en die volgende kan redelikerwys daarvan afgelei word: (1) Dat die Suid-Afrikaanse poliomiëlitis-entstof veilig is en dat die gebruik daarvan besonder reaksie-vry is; (2) dat dit net so doeltreffend is soos die Amerikaanse en Britse geformaliseerde entstof geblyk het te wees, en dat 'n opvallende hoë beskermingsgraad met slegs 2 dosisse verkry is; en (3) dat daar met veiligheid, selfs gedurende 'n tydperk van ernstige plaaslike voorkoms van poliomiëlitis, met beskermende inenting voortgegaan kan word. Die derde gevolgtrekking stem ooreen met die bevindinge wat gedurende die Chicago-poliomiëlitis-epidemie van 1956 gemaak is.³ (Sien bladsy 705 van hierdie uitgawe.)

Dr. de Villiers moet gelukkigwens word met die suksesvolle organisasie van sy poliomiëlitis-inentingsprogram. Deur sy weiering om deur die ernstigste epidemie van die siekte wat die Kaapse Skiereiland ooit ondervind het, afgeskrik te word, het hy 'n waardevolle bydrae gelewer tot ons kennis aangaande die veiligheid van inenting gedurende die voorkoms van poliomiëlitis, asook tot die moontlikheid om 'n plaaslike epidemie deur 'n intensiewe inentingsveldtog te bestry. Dit is 'n redelike gevolgtrekking van dr. Mitchell se getalle dat, deur die inenting van die 6,000 blanke kinders, meer as 20 van hulle moontlik van 'n aanval van hierdie gevreesde siekte gespaar is.

GEVOLGTREKKING

Die gebruik van poliomiëlitis-entstof is nog in die beginstadium en alhoewel die doeltreffendheid daarvan nou bewys is, het die gebruik daarvan nog nie 'n belangrike uitwerking op die algemene voorkoms van die siekte gehad nie. Bowendien moet die duur van die immuniteit wat dit verskaf nog vasgestel word—dit kan slegs met die verloop van tyd gedoen word. Baie struikelblokke moet uit die weg geruim word voordat universele immunisering bereik kan word. Een van die

10 in the Cape Division. In addition about 3,600 non-European children were inoculated, mostly in September 1955, but only about one-fourth of these presented themselves for the second dose.

Dr. Mitchell reports that while from 1 January to 31 May 1957 58 cases of poliomyelitis were reported amongst the unvaccinated European children under 10 in the Cape Division (their number is estimated at 12,500), only 2 cases occurred amongst the 6,000 inoculated European children of that age. The large majority of these were paralytic cases of poliomyelitis. Expressed, therefore, as cases per 100,000, the incidence of poliomyelitis amongst European children under 10 during this epidemic period was 464 in the unvaccinated and 33 in the vaccinated. This represents a 90% level of effectiveness.

As regards safety, Dr. Mitchell reports that in none of the 15,700 injections given did any reaction occur which could reasonably be attributed to the vaccine, and that local reactions and allergic reactions were entirely absent. Only one child was notified as suffering from poliomyelitis within 30 days of the date of inoculation. This child, a European boy of 9, was notified 10 days after inoculation, and reasons are given¹ for concluding that the infection was contracted naturally and that the vaccine was not to blame.

The author of this investigation states that the data do not 'permit of proven statistical conclusions being drawn'. Nevertheless, they are very striking, and the following can reasonably be inferred: (1) That the South African poliomyelitis vaccine is safe and its use singularly free from reactions; (2) that it is quite as effective as the American or British formalized vaccine has been shown to be, and that a significantly high protection rate has been achieved with 2 doses only; and (3) that protective inoculation can safely be pursued even during a period of high local prevalence of poliomyelitis. This third conclusion is in line with the findings during the Chicago poliomyelitis epidemic of 1956³ (see page 705 of this issue).

Dr. de Villiers is to be congratulated on the successful organization of his poliomyelitis vaccination programme. By his refusal to be deterred by the greatest prevalence of the disease that the Cape Peninsula has ever experienced he has made a valuable contribution to our knowledge concerning the safety of inoculation during the prevalence of poliomyelitis, and to the possibility of combating a local epidemic by an intensive vaccination campaign. It is a reasonable conclusion from Dr. Mitchell's figures that by the inoculation of the 6,000 European children, more than 20 of them were probably saved from an attack of this dreaded disease.

CONCLUSION

The use of poliomyelitis vaccine is still in its early stages and, although its efficiency is now proved, its application has not yet had a great effect on the general prevalence of the disease. Moreover the duration of the immunity it confers has still to be ascertained—which can only be done in the course of time. Many obstacles have to be faced in achieving universal immunization. One is the great sacrifice of monkeys involved.

grootste opofferings is die ape wat gebruik word. Baie navorsers vertrou dat verdere ontdekkings van vervaardigingsmetodes 'n oplossing van tegniese moeilikhede sal bied. Dit is interessant om te weet dat die moeilikhede wat onlangs die vervaardiging van die entstof op 'n voldoende skaal in Suid-Afrika verhoed het, ook in Brittanje teengekom is. Selfs in die VSA, al word 'n gedeelte uitgevoer, is die huidige grootskaalse vervaardiging van entstof slegs een helfte van die hoeveelheid wat nodig sal wees om inenting van die hele bevolking onder 40 jaar te voltooi.

1. Mitchell, F. K. (1957): S. Afr. T. Geneesk., 31, 671.
2. M.R.C. Polio. Vaccines Committee (1957): Brit. Med. J., 1, 1271.
3. Polio. Surveillance Unit (1957): Publ. Hlth. Rep. (Wash.), 72, 381.

Many investigators look to further discoveries of production methods for the solution of technical difficulties. It is interesting to know that the obstacles which have recently prevented the production of the vaccine on a sufficient scale in South Africa have also been encountered in Britain. Even in the US, though a portion is exported, the present enormous production of vaccine is only one-half of the amount that would be required to complete the vaccination of the whole population under 40 years of age.

1. Mitchell, F. K. (1957): S. Afr. Med. J., 31, 671.
2. M.R.C. Polio. Vaccines Committee (1957): Brit. Med. J., 1, 1271.
3. Polio. Surveillance Unit (1957): Publ. Hlth. Rep. (Wash.), 72, 381.

A STUDY OF HYPERTENSION IN THE BAHAMAS

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The incidence of arterial hypertension in Bahamians is on an average higher than in Africans or Europeans, who comprise the racial background from which Bahamians are mainly derived. Most of the people studied in the present survey were patients attending the Princess Margaret Hospital in Nassau and out-island clinics. Some were hotel employees or food handlers sent for periodical examinations. The majority were of predominantly African stock. It seemed strange that they should suffer from hypertension, especially considering that important causes of the disease are known to be hereditary and constitutional. It was therefore reasonable to attribute responsibility to extraneous factors which did not operate in Africa.

This investigation was instigated by a visit to Mangrove Cay, Andros, where, out of 88 patients attending the clinic, 13 were found to have systolic pressures of 150 mm. Hg. or more. Probably many others were undetected. Of these 13, 5 exhibited systolic pressures of between 180 and 200 mm., and 4 of over 200 mm. The diastolic pressures also tended to be high.

The water at Mangrove Cay tasted salty, and, considering that one of the recognized treatments of hypertension is to reduce the intake of salt, it was thought that there might be some connection between the prolonged intake of brackish water and the development of hypertension.

Very little work has been done on this subject. An annotation in *Nutrition Reviews* (1955) comments on a report by Dahl and Love (1954) which develops the hypothesis that 'relatively high levels of dietary intake of sodium chloride may have a significant role in the evolution of essential hypertension in man'. The authors state that an intake of sodium in excess of an undefined level is a necessary but not totally sufficient factor in the development of essential hypertension, other factors being of unquestioned importance in the evolution of the disease. The annotation further refers to observations by Sapirstein *et al.*, (1950) and Meneely *et al.*, (1953) on experimental animals indicating that high levels of intake of sodium chloride are important to the development of hypertension.

The main object of the present study was to find out whether there was in fact any connection between salt intake and hypertension in the Bahamas and, if possible, to discover what other factors could be incriminated. The people's blood pressures were taken without selection of suspicious cases. Of 462 examined, 189 (41%) were found to have systolic pressures of 150 mm. or over. This included both sexes and all ages from 18 years upwards. In 71 (15%) the systolic pressure was 180 mm. or more.

Questionnaire and Clinical Details

The following questionnaire was used:

Name, age, sex, occupation and address.

On which island have you lived longest?

For women. Number of children and miscarriages. Whether going through or past the menopause.

For both sexes. Have you much worry? About what? (husband, children, worry, health, etc.)

What do you eat? (mainly directed towards finding out whether diet consisted almost entirely of grits, rice, and other carbohydrate foods).

Do you drink alcohol? Do you smoke?

Previous illnesses (especially 'stroke', renal disease and diabetes).

Are your bowels open regularly? State if very constipated. (Patients who went for a week without a bowel action were grouped as 'very constipated'.)

The following clinical details were then noted: Obesity, pulse rate and compressibility, blood pressure, heart and other abnormalities, retinal changes, urine.

RESULTS

The results were classified under 3 main headings:

Group 1: Males.

Group 2: Females who had not been pregnant.

Group 3: Females who had been pregnant.

Each group was then subdivided into 6 age groups, as shown in Table I.

Blood pressures were recorded whenever possible with the patient in the sitting position. The diastolic pressure was taken at the reading where the loud sound became faint—not at the total disappearance of all sounds—while deflating

the cuff. of 110 mm. or over. The term pressure of

Results following alcohol, co-multiparity and comp-sideration and retina-systolic pr

Salinity

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the cuff. In all but 2 persons examined a diastolic pressure of 110 mm. or over was associated with a systolic of 150 mm. or over. The diastolic pressures are shown in Table II. The term 'hypertension' in this article implies a systolic pressure of 150 mm. or more without reference to the diastolic.

Results were arranged to determine the effects of the following factors: salinity of the water drunk, tobacco, alcohol, constipation, worry, diet, obesity, occupation, and multiparity. An attempt was made to correlate tachycardia and compressibility of the pulse with blood pressure. Consideration was given to associated diseases, and the urine and retinae were examined where possible in patients with systolic pressures of 180 mm. or over.

Salinity

In the Bahamas the salinity of the water drunk has always been high, except in Nassau itself during the last 4 years. In defining the chemical characteristics of acceptable water supplies in the USA, Babbitt and Doland (1931) state that the chlorides should not exceed 250 parts per million, i.e. 412.5 ppm of sodium chloride. The salinity (expressed as sodium chloride) of the water drunk in Nassau from 1935 to 1953 is indicated below:

1935	560 ppm	1950	812 ppm
1940	630 ppm	1951	854 ppm
1945	1,330 ppm	1953	104 ppm
1948	840 ppm.		

Since 1953 it has remained low.

The average salinity of 48 wells on the out-islands was 893 ppm. This is probably a low estimate, for wells with excessively salty water were not included. Samples were taken by the writer personally from 5 wells from which the public obtain their drinking water. The salinity was as follows:

Clarencetown	810 ppm.
George Town	1,320 ppm.
Barra Terre	1,370 ppm.
Simms	1,160 ppm.
Bennett's Harbour	200 ppm.

The sodium-chloride content of wells and boreholes is high because the islands are low-lying and filtration takes place from the sea, though there is also a certain amount of wind-blown salt. There are no rivers in the Bahamas.

Another feature observed is that the sodium-chloride content of the water on the out-islands is considerably higher than that of Nassau which, before 1940, was on an average below 600 ppm. During the war, with increased demands on water supply, it rose. In 1945 it reached a peak of 1,330 ppm., after which it gradually dropped to a low level.

On the out-islands, where opportunities for refrigeration of foodstuffs are almost non-existent, pickled foods are consumed much more than in Nassau. Salt pork and salt fish are eaten on some of the out-islands in fairly large quantities. Bahamians eat much salt with their food and dislike being put off salt.

The systolic pressures of people from Nassau were therefore compared with those from the out-islands, as shown in Tables III and IV. It will be observed that pressures were higher on the out-islands and that the higher incidence applied to all 6 age-groups.

This did not however prove that the higher incidence of

hypertension on the out-islands was entirely due to a higher intake of salt in the water.

Smoking

The question whether they smoked was asked of 422 people. Those with hypertension included 52% of smokers; non-hypertensives 45%. The figures suggest that smoking raises blood pressure a little in the Bahamas. There was the same percentage of smokers in Nassau as on the out-islands—48% in each.

Alcohol

Hypertensives included 44% of drinkers; non-hypertensives 41%. Alcohol was therefore considered to have only a slight effect on blood pressure. The series included 13 inveterate alcoholics (9 men and 4 women). In 5 of these the systolic pressure was 150 mm. or more, but in none was it over 165 mm.

Constipation

In all groups 39% were constipated. There was no significant relationship between mild constipation and blood pressure. Those subject to severe constipation were too few in number to provide grounds for any definite conclusion, but there was apparently a tendency for severe constipation to be associated with a high blood pressure.

Worry

This was apparently a significant factor in raising blood pressure; 39% of hypertensives worried, while only 26% with pressures below 150 mm. worried. On estimating the comparative percentages of 'worriers' in Nassau and on the out-islands it was found that 37 out of 132 (28%) of the people in Nassau worried as compared with 93 out of 275 (34%) on the out-islands. The reason for this could not be explained. The worry of the out-islanders affected mainly Group 3—44% in this group worried as compared with 36.5% in Nassau. Of 115 people questioned about the causes of their worry, 34 stated that the main cause was their children, 24 their husbands (or 'boy friends*'), 21 their health, 8 economic difficulties, 5 their wives (or 'girl friends*'), and 23 worried about various matters. Of those women whose worry was occasioned by their male partners the cause was alcoholism in 10 instances. Only 2 examinees—both males—expressed any concern about the responsibilities of their work.

Diet

Bahamians eat much salt and fry their food, including grits, rice and peas, with the fat of salt pork. Of 337 people asked about their diet, 181 (54%) ate a preponderantly carbohydrate diet, consisting mainly of grits (i.e. ground maize), rice, peas and bread. A larger proportion of people on this diet suffered from hypertension than those on more varied diets (see Table VII). The proportion of people consuming carbohydrate diets was higher on the out-islands than in Nassau, as shown in Table VIII.

Obesity

The effect of obesity was investigated in 335 people. Those with hypertension included 51% with obesity; non-

* In the Bahamas the terms 'boy friend' and 'girl friend' have no reference to age but purely to social (and reproductive) status.

hypertensives 42%. In Nassau only 36% of the people were obese; on the out-islands 50%. Of those who were obese 66% lived on a carbohydrate diet while only 45% of the non-obese lived on this type of diet.

Occupation

The people in Group I were representatives of over 20 occupations. No occupation appeared to predispose towards hypertension. In both sexes there was apparently no connection between occupation and blood pressure.

Multiparity

Women in the Bahamas have large families. Numerous pregnancies did not apparently cause hypertension, for in Group 3 the average number of pregnancies was no higher in hypertensives than in those with normal blood pressures (see Table X). In the series 44 women had been pregnant 10 or more times. Of these 23 were hypertensives, i.e. 52%—a figure corresponding closely to the percentage of hypertensives among all in this series between the ages of 41 and 50 years. The number of women in Group 2 was too small to compare with Group 3, and most were comparatively young.

Tachycardia

It might be thought that the high incidence of hypertension could be attributable largely to nervousness of the examinees. If so, nervousness would surely also manifest itself by tachycardia. The pulse rates of 358 people were therefore taken. It was 100 or more beats per minute in 65, i.e. 18%. Tachycardia was present in 21% of those with hypertension and in 16% of those with normal pressures. There was therefore a difference of only 5% between the two groups. It is unlikely that hypertension was due to nervousness to any great extent. In some it was associated with cardiac disease.

Compressibility of the Pulse

The pulse of 318 people was examined for digital compressibility. It was difficult to compress in 71 (22%). In those with hypertension 'dyscompressibility' was present in 27%; in those without hypertension in 18%. 'Dyscompressibility' increased with advancing years to 42% in patients over the age of 60 years. It was found to be useless as a means of estimating blood pressure. An easily compressible pulse was found in 15 patients with systolic pressures of 200-250 mm. 'Dyscompressibility' was present in 33 with systolic pressures below 150 mm. In 10 of these the pressure was between 95 and 110 mm.

'Dyscompressibility' was present in 35% of those with diastolic pressures of 110 mm. or over, and in 19% of those under 110 mm.

Cardiac Disease

An attempt was made to detect cardiac disorders in as many people as possible, but as some clinics were held in public places, such as school rooms on the out-islands, the examinations were incomplete. The hearts of 261 people were examined. Abnormalities were found in 30, 24 of which had hypertension. The conditions detected were as follows:

Accentuated or 'hollow' second sound at base	12 patients
Basal systolic murmur	8 "
Auricular fibrillation	4 "
Extrasystoles	3 "
Basal systolic with accentuated or 'hollow' second sound	3 "

Cerebral Haemorrhage

This is a common condition in the Bahamas and a frequent cause of death. In this series, however, in which the patients were ambulatory, only 6 with paralysis due to a previous 'stroke' were observed, 2 in Group 1 and 4 in Group 3.

Urine

Examination of the urine and optic fundi was reserved mainly for patients with systolic pressures of 180 mm. or more. On most occasions it was impossible to carry out these examinations. The urine was tested for albumen in 28 patients. Definite albuminuria was present in 3 and a trace in 4. The test for sugar was performed in 29. Moderate glycosuria was present in 3 and a trace in 6. It is common to find a trace of sugar in the urine of Bahamians on account of the high carbohydrate diet.

The urine in Bahamians is usually neutral or slightly alkaline.

Optic Fundi

The fundi were examined in 30 patients. They were normal in 24. Thickening of the walls of the arteries with narrowing of the calibre was present in 2; thickening with distention of the veins on the distal sides of arterio-venous crossings in 1; engorgement of veins in 1; primary optic atrophy in 1; and extreme pallor of the discs in 1. There was no evidence of haemorrhages or oedema of the fundus in any patient examined.

COMMENTS

Worry, a carbohydrate diet, obesity, and salinity of drinking water and food are apparently the most important causes of hypertension in the Bahamas.

The effect of worry is well known as a cause of hypertension. The fact that 6% more people said that they worried on the out-islands than in Nassau may partly account for the greater incidence of hypertension there, but this is open to doubt, for the 'pace of living' on the out-islands is slower than in Nassau, the 'Big City' of the Bahamas. It seems unlikely that the out-islanders' worry should have more serious effects on their blood pressures.

The findings that 16% more out-islanders than Nassauvians lived on carbohydrate diets, and that approximately 63% of people on such a diet suffered from hypertension, strongly suggest that this type of diet is an important cause of the out-islanders' hypertension. It was established that 21% more of those who were obese lived on a carbohydrate diet than of those who were not obese. This also suggests that a carbohydrate diet predisposes towards hypertension.

Obesity was apparently associated with hypertension, for the incidence of obesity was 9% higher in hypertensives than in those with normal pressures. The correlation between hypertension and obesity is of course generally acknowledged.

Comparatively few of the patients suffered from cardiac or renal disease or diabetes. Hypertension apparently occurred as a primary condition.

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Over 70

Total

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31-40
41-50
51-60
61-70
71+..

Total

In spite of the strong evidence suggesting that a carbohydrate diet is the most important factor in the causation of hypertension in the Bahamas and for its greater incidence on the out-islands, there are strong objections to this hypothesis. The rural Natives of South Africa live to an even greater extent than Bahamians on a carbohydrate diet—mealie meal. In the Belgian Congo and on the Gold Coast they live largely on cassava. Chinese and Indians eat a great deal of rice. In these people hypertension is rare save under exceptional circumstances. In carbohydrate-consuming Natives of South, Central and West Africa the writer saw few instances of paralysis due to cerebral haemorrhage over a period of 14 years; in the Bahamas he saw a great many in 1 year.

Some additional factor besides a carbohydrate diet must be held responsible for the Bahamians' tendency towards hypertension. Comparing the Bahamian with the African, three possibilities suggest themselves:

1. That the more or less permanent state of hunger in which many rural Africans habitually live prevents them from developing hypertension. The rural African gorges himself at times of plenty but most of the time there is scarcity. In the Bahamas there is seldom any scarcity of carbohydrates. Africans are *undernourished*, while about 50% of Bahamians are *ill-nourished* from a diet of carbohydrate excess. Many are *over-nourished* from attempts to alleviate an apparently insatiable appetite. There may be some truth in this explanation, but it does not explain why hypertension is comparatively rare even in well-fed Africans while it is prevalent in Bahamians as a group.

2. That most Africans die before they become old enough to develop hypertension. This would account for the rarity of cerebral haemorrhage. But hypertension is common in young as well as in old Bahamians, while it is rare in Africans of any age. Further, some Africans reach very advanced

ages. Instances are on record of their reaching 130 years, while the writer has been unable to trace any record of a Bahamian reaching the age of 110 years.

3. That sodium chloride, which is taken in large quantities in both the food and drinking water of Bahamians (but not in that of the Africans known to the writer), is the essential additional factor in the causation of their hypertension. It is submitted here that this is the most likely explanation. Moreover, it seems probable that an excessive intake of salt may be a cause of hypertension in other parts of the world.

SUMMARY

1. Reasons are given for suspecting that hypertension in the Bahamas is caused by the prolonged intake of brackish water.
2. Results of examining 462 persons are recorded.
3. The questionnaire and clinical details are described.
4. The method of recording blood pressures is stated.
5. The results are tabulated under 18 headings.
6. The salinity of the water in Nassau and on the out-islands is compared.
7. The effects on blood pressure of smoking, alcohol, constipation, worry, diet, obesity, occupation and multiparity are recorded.
8. The importance of tachycardia and compressibility of the pulse are considered.
9. Mention is made of diseases associated with hypertension.
10. An evaluation of the various factors responsible for hypertension is attempted.
11. It is concluded that the excessive intake of sodium chloride is an important factor in the causation of hypertension in the Bahamas.

TABLE I. SYSTOLIC PRESSURES (MM. HG)

Age	Group 1			Group 2			Group 3			Total		
	150+	—150	%150+	150+	—150	%150+	150+	—150	%150+	150+	—150	%150+
18-30	10	38	21	3	20	13	11	57	16	24	115	17
31-40	17	32	35	0	6	0	21	42	33	38	80	32
41-50	17	17	50	4	2	67	30	26	54	51	45	53
51-60	9	7	56	3	1	75	21	16	57	33	24	58
61-70	7	3	70	1	1	50	18	3	86	26	7	79
Over 70	6	0	100	2	1	67	9	1	90	17	2	90
Total	66	97	40	13	31	30	110	145	43	189	273	41

TABLE II. DIASTOLIC PRESSURES (MM. HG)

Age	Group 1		Group 2		Group 3		Total		
	110+	—110	110+	—110	110+	—110	110+	—110	%110+
18-30	4	43	0	22	2	65	6	130	4
31-40	7	41	0	5	5	58	12	104	10
41-50	5	29	2	4	10	46	17	79	18
51-60	2	15	1	3	6	31	9	49	16
61-70	3	7	0	2	8	13	11	22	33
71+	4	2	1	1	4	6	9	9	50
Total	25	137	4	37	35	219	64	393	14

TABLE III. NASSAU

Age	Group 1		Group 2		Group 3		Total		
	150+	-150	150+	-150	150+	-150	150+	-150	%150+
18-30	4	15	1	4	1	21	6	40	13
31-40	6	10	0	0	2	8	8	18	31
41-50	5	10	1	0	9	8	15	18	45
51-60	4	3	2	0	4	6	10	9	53
61-70	1	1	0	1	5	1	6	3	67
71+	2	0	1	1	1	0	4	1	80
Total	22	39	5	6	22	44	49	89	36

TABLE IV. OUT-ISLANDS

Age	Group 1		Group 2		Group 3		Total		
	150+	-150	150+	-150	150+	-150	150+	-150	%150+
18-30	5	16	2	16	10	36	17	68	20
31-40	9	18	0	6	19	34	28	58	33
41-50	10	6	3	2	21	18	34	26	57
51-60	5	5	1	1	17	10	23	16	59
61-70	6	2	1	0	13	2	20	4	83
71+	4	0	1	0	8	1	13	1	93
Total	39	47	8	25	88	101	135	173	44

TABLE V. EFFECT OF SMOKING

Age	Group 1				Group 2				Group 3				Total			
	150+		-150		150+		-150		150+		-150		150+		-150	
	S	N-S	S	N-S	S	N-S	S	N-S	S	N-S	S	N-S	S	N-S	S	N-S
18-30	6	3	8	20	0	3	3	16	6	5	13	42	12	11	24	78
31-40	10	5	24	4	0	0	1	5	7	12	20	20	17	17	45	29
41-50	13	2	5	1	1	3	1	1	18	12	15	10	32	17	21	12
51-60	5	4	2	5	2	1	1	0	7	14	11	4	14	19	14	9
61-70	6	1	2	1	0	1	0	1	6	12	2	1	12	14	4	3
71+	3	3	0	0	2	0	0	0	2	7	0	1	7	10	0	1
Total	43	18	41	31	5	8	6	23	46	62	61	78	94	88	108	132
%	70	30	57	43	38	62	21	79	43	57	44	56	52	48	45	55

S=Smokers. N-S=Non-smokers.

TABLE VI. EFFECT OF WORRY

Age	Group 1				Group 2				Group 3				Total				% who worry
	150 +		-150		150 +		-150		150 +		-150		150 +		-150		150 + -150
	W	NW	W	NW	W	NW	W	NW	W	NW	W	NW	W	NW	W	NW	
18-30	3	6	6	23	0	2	1	18	4	5	11	43	7	13	18	84	35 18
31-40	2	11	8	18	0	0	0	6	7	11	11	27	9	22	19	51	29 27
41-50	2	13	3	14	2	2	0	2	13	15	13	10	17	30	16	26	36 38
51-60	1	7	2	6	2	1	0	1	10	11	10	5	13	19	12	12	41 50
61-70	1	6	0	3	0	1	0	1	10	7	0	3	11	14	0	7	44 0
71 +	2	4	0	0	0	2	0	0	7	1	0	1	9	7	0	1	56 0
Total	11	47	19	64	4	8	1	28	51	50	45	89	66	105	65	181	39 26

W=Worry. NW=No worry.

TABLE VII. EFFECT OF DIET

Age	Group 1				Group 2				Group 3				Total				% GR	
	150+		-150		150+		-150		150+		-150		150+		-150		150+	-150
	GR	V	GR	V	GR	V	GR	V	GR	V	GR	V	GR	V	GR	V		
18-30	1	6	7	16	1	1	3	11	8	2	25	16	10	9	35	43	53	45
31-40	3	6	7	14	0	0	0	5	11	8	15	14	14	14	22	33	50	40
41-50	5	6	2	8	2	1	1	1	21	6	13	6	28	13	16	15	68	52
51-60	3	1	2	4	3	0	1	0	11	7	6	4	17	8	9	8	68	53
61-70	1	3	3	0	1	0	0	0	10	7	2	0	12	10	5	0	55	100
71+	3	2	0	0	2	0	0	0	8	0	0	1	13	2	0	1	87	0
	16	24	21	42	9	2	5	17	69	30	61	41	94	56	87	100	63	47

GR=Grits and Rice. V=Varied.

TABLE VIII. DISTRIBUTION OF DIETS

		Nassau		Out-Islands	
		GR	V	GR	V
All Ages	..	42	55	140	97
%	..	43	57	59	41

The writer wishes to thank Dr. Norman MacLennan, Chief Medical Officer, Bahamas, for his help, interest, and encouragement. For their helpful cooperation and assistance he also thanks Dr. Luther J. Hord of Inagua, Dr. Frank Duck (Director of the Laboratory in Nassau), Nurse Lincoln Davis (of Mangrove Cay, Andros), Miss C. Clapham and Miss D. Dean (of the Bahamas Red Cross Society), Mr. A. C. Langlois (Director of the Public

TABLE IX. EFFECT OF OBESITY

Age	Group 1				Group 2				Group 3				Total				% Obese	
	150+		-150		150+		-150		150+		-150		150+		-150		150+	-150
	O	NO	O	NO	O	NO	O	NO	O	NO	O	NO	O	NO	O	NO		
18-30	0	6	2	19	1	2	7	8	3	7	17	23	4	15	26	50	21	34
31-40	4	5	5	15	0	0	5	0	14	4	20	9	18	9	30	24	66	27
41-50	6	6	1	9	4	0	1	1	16	12	13	5	26	18	15	15	59	50
51-60	0	4	0	6	2	1	0	1	10	8	2	9	12	13	2	16	48	11
61-70	2	1	0	3	0	1	0	0	10	7	3	0	12	9	3	3	57	50
71+	1	4	0	0	1	1	0	0	2	5	1	0	4	10	1	0	29	100
	13	26	8	52	8	5	13	10	55	43	56	46	76	74	77	108	51	42

O=Obesity. NO=No obesity.

TABLE X. EFFECT OF MULTIPARITY

		Average No. of Pregnancies		Live Children
		150+	-150	All Pressures
18-30	..	2.9	3.9	3.0
31-40	..	6.6	6.0	5.5
41-50	..	6.2	7.7	5.5
51-60	..	5.6	5.6	4.6
61-70	..	5.8	2.6	4.5
71+	..	7.6	17.0*	7.5

* One case only.

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BYVOEGSEL TOT DIE TYDSKRIF

Lede van die Mediese Vereniging van Suid-Afrika word daaraan herinner dat, indien hulle dit nog nie gekry het nie, hulle 'n afskrif van die byvoegsel tot die *Suid-Afrikaanse Tydskrif vir Geneeskunde*, bekend as 'Medicine in South Africa—Medisyne in Suid-Afrika (1957)', vry op aanvraag sal ontvang as hulle aan die Sekretaris van die Vereniging, Waalstraat 35, (Postbus 643), Kaapstad, skryf. Die byvoegsel bevat die Engelse vertaling van 14 artikels deur Suid-Afrikaanse skrywers

wat in die Portugese Mediese Tydskrif *O Medico* verskyn het onder die beskerming van die Suid-Afrikaanse Raad vir die uitruil van Mediese Wetenskappe, tesame met boodskappe van sy Eksellensie, die Portugese Ambassadeur (generaal A. Pinto) en die Edelagbare J. H. Viljoen (Minister van Kuns, Wetenskap en Onderwys en Minister van Gesondheid). Hierdie byvoegsel, wat 157 bladsye beslaan, is uitgegee onder die beskerming van die Suid-Afrikaanse Raad vir die uitruil van Mediese Wetenskappe.

THE THREAT OF HYDATID DISEASE TO THE SOUTH AFRICAN CITIZEN

I. F. DE VILLIERS, M.B., CH.B. (CAPE TOWN)

Koffiefontein

Despite the fact that our age is increasingly called upon to face many serious threats to our physical and psychological well-being, one should not be deterred from exposing yet another threat, even if it means causing alarm about an animal generally accepted as a friend to man.

The subject of this article is of vital interest to the South African citizen since it concerns a parasite which, for its very existence and propagation, is entirely dependent on sheep-raising and whose prevention is not so remotely impossible as is generally assumed.

Hydatid disease is the infestation of man by the larvae or cystic forms of the tapeworm *Taenia echinococcus*, and as yet it has failed to arouse the interest and vigilance of the medical profession and the lay public.

MORPHOLOGY AND PATHOLOGY

The history of the tapeworm *Taenia echinococcus* is probably as old as the history of mankind itself since both man and his domestic animals are vitally necessary for its existence and propagation; it needs two hosts—a definitive host and an intermediate host—to complete its life cycle.

The *definitive hosts*, which harbour the adult worm, are the dog, the jackal or silver fox, the hyena and all other members of the canine species. It does not reach maturity in the cat. The dog can be confidently implicated as the definitive host *par excellence*.

The *intermediate hosts*, in which the larval phase develops, include sheep, cattle, pigs, buffaloes and other herbivorous animals. In South Africa the sheep is the natural intermediate host and since the Union of South Africa has 38 million sheep, it is evident what enormous possibilities are present for the distribution of the larval phase, which is responsible for the perpetuation of the life cycle.

The adult worm, $\frac{1}{2}$ inch in total length, inhabits the small intestine of the dog; it consists of a scolex, i.e. a head and neck, and 3 proglottides, or self-contained ribbon-shaped pieces, attached; the entire worm resembling a partitioned ribbon. The scolex is round and has a rostellum with 30-60 hooks in 2 rows. Each hook when released from the scolex can develop into a hydatid cyst or other larval forms in the intermediate host. It also has 4 suckers by which it attaches itself to the inner lining of the host's small bowel. As in all tapeworms it is hermaphroditic, i.e. each separate segment has male as well as female sexual organs incorporated into it, and it fertilizes itself. Consisting as it does of 3 such segments, the first is immature, the second is sexually mature, and the third segment, which is about half the length of the entire worm and is gravid, i.e. pregnant, contains up to 50,000 eggs. This end is shed and passed in the faeces onto the soil and pastures, where each egg has remarkable powers of survival from 6 to 12 months outside its host's body. The sheep, its natural intermediate host, grazes over the contaminated pastures and ingests the eggs along with its feed. Man becomes infected accidentally by ingesting the eggs which get on to his hands from an infected dog's skin, paws and muzzle, or from dogs, uninfected

internally, whose skin and hairy coats have been contaminated by rolling on sand patches on the farmyards contaminated with egg-laden dog faeces. The egg, by whatever means it gets onto man's hands, is eventually swallowed and absorbed in the small bowel along with digested foods and the larva passes into the portal circulation, which drains blood from almost the whole of the abdominal part of the digestive tube and digestive glands, and passes *via* the portal vein to the liver. The percentage incidence of hydatids in human organs was found in one series in Britain¹ to be as follows: Liver 66, lungs 16, abdominal organs 8, cranial cavity 7, kidneys 7, bones 2.

Hydatid disease is liable to occur anywhere in the digestive tract, but the liver is most often infested in man. Here the larva settles down, most often in the right lobe of the liver, and causes cyst formation.

If the larva passes into the systemic circulation the hydatid has to go through the lungs, but it often settles down to cause hydatid disease of the lungs themselves.

Hydatid disease frequently occurs in the human brain (7%), mostly in the form of a cyst which causes an increased intracranial pressure. The unilocular cyst grows to a considerable size, distorting the cerebral architecture so that the patient may present with a great variety of neurological symptoms.

Among the 3 types of primary hydatids that occur in man are the following:

1. *The unilocular cyst*, which consists of an outer non-nucleated laminated layer 1 mm. thick, an inner nucleated germinal layer, and a fibrous outer covering where the organ is capable of reacting and producing such a sheath. Bud-like thickenings soon appear on the inner germinal layer and break off in loops from it to form vesicles or brood capsules. From 5 to 20 buds appear on the inner surface of their walls. These develop into invaginated scolices with 4 suckers and a double row of hooks and are the mature larvae; later on these brood capsules rupture and the scolices pass into the fluid of the original cyst to produce the 'hydatid sand'.

2. *Osseous cyst*. Enlargement of this cyst follows the line of least resistance and it can cause spontaneous fractures in limb bones and the vertebrae.

3. *Alveolar cyst*. This cyst is an irregular spongy mass of small irregular cavities filled with a gelatinous material resembling snails.

TREATMENT OF HYDATID DISEASE IN MAN

There is no effective non-surgical treatment for hydatid disease in man and radical surgery is the only treatment that can be offered. This implies accessibility of the cyst or cysts and the avoidance of spilling the contents of a cyst into the body cavities. When the cyst is in a limb bone, amputation is the treatment of choice.

Accessible cysts in the cranium are frequently successfully removed. Neuro-surgeons, emboldened by the array of antibiotics at their disposal do not hesitate to perform

radical surgery on the brain for hydatids or for the scarring caused by them.

Prevention

Transmission of hydatid disease to man occurs by the ingestion of eggs of the tapeworm *Taenia echinococcus* from the skin or paws or mouth of dogs infected with the worm and the coat and skin of dogs that have been contaminated by rolling on egg-laden farm soil, or lawns. This latter aspect has been emphasized above and constitutes the threat to man. Infection may also occur from ingestion of uncooked vegetables or other foodstuffs contaminated with ova from dog faeces. One fact, however, is unequivocally clear, viz. that hydatid disease in man is caused by the dog, both directly and indirectly from articles contaminated by it. Dr. Alexander, Director of Veterinary research at Pretoria, issued a warning to South Africans not to fondle or caress dogs or stroke dogs' backs; close contact directly with the dog is here inferred, but the indirect aspect should not be lost sight of.

The farmer's dog is the most dangerous to man since it can directly cause an egg to be conveyed to one's hands or it can contaminate all the other dogs on the farm, domestic and parlour dogs included, with eggs of the tapeworm which they have dropped in their faeces on the lawns and other playgrounds of children.

The above has an ominous bearing on the incidence of human hydatid disease and the health and well-being of the South African citizen, for human infection occurs in early childhood when the child of 4-7 years old has not yet acquired that degree of personal hygiene and knowledge to safeguard himself. He becomes very fond of his dog, the legendary friend of man, which may also turn out to be the bearer of a most disastrous disease, manifesting itself 40 or 50 years later as hydatid scarring of the brain with epilepsy or mental deterioration or paralysis; or a lung infection with hydatid cysts.

SLAKSIEKTE

The name *slaksiekte* is given to hydatid disease taking the form of a perennial disease occurring in robust young lambs in this southern part of the Orange Free State and which periodically assumes an epidemic form. It has the following features:

1. The affected animal falls to the ground or hurts itself by falling against sharp edges of stones forming the wall of a kraal and in fact against anything in its vicinity, e.g. a stationary wheelbarrow.

2. It appears stupid and mentally blunted and does not appreciate its surroundings. It runs blindly into stone walls and objects around it, which has earned for the disease, with characteristic acuteness of the observant farmer, the name of *Malkopsiekte*.

3. The animal will be standing normally and will fall very suddenly on its back, all four limbs jerking for a time, and will then lie still, giving the farmer the impression that it is unconscious. After a time it gets up as if nothing had been wrong with it and walks away.

This description recalls the classic description of the epileptic state with grand-mal seizures in man.

The bony head of such a sheep is usually soft and pulpy on its vault and if opened after the sheep is dead, is found

to be full of gelatinous-like cysts which are called *slakke*—Afrikaans for 'snails', which they resemble.

An astute farmer, completely baffled by this disease, sent the head of a sheep's carcass which had died from it to Onderstepoort Veterinary Research Institute at Pretoria for diagnosis. The report came back indicating that the head of the sheep's carcass contained larvae of the tapeworm *Taenia echinococcus*, of which the sheep is the natural intermediate host.

The term '*slaksiekte*' is also frequently used to denote other hydatid disease in animals and human beings.

CONTRIBUTORY FACTORS TO THE INCIDENCE OF HYDATID DISEASE IN SOUTH AFRICA

1. This disease, though of world-wide distribution, is most prevalent in sheep- and cattle-raising countries. In South Africa sheep raising constitutes one of the most profitable types of farming. The wool industry alone has contributed £850 million to our national income since 1910 and, apart from the wool industry, the meat industry has benefited because of the increased demand for mutton as a result of the phenomenal expansion of gold mining developments in the O.F.S. and Transvaal. Sheep raising, then, whether alone or in mixed farming, which probably is the more popular tendency, has become a major type of farming and, with all its associated conditions, assures the perpetuation of the tapeworm *Taenia echinococcus*.

2. Whereas sheep raising was formerly mainly confined to the Karoo and Karoo-type of veld (in all the provinces of the Union), it has now become an important and most profitable branch of farming to the wheat and maize growers.

3. The spread of hydatid disease is also favoured by the disappearance of a definite division between urban and rural life. It started with peri-urban areas which brought small holdings right up to the boundaries of our cities. Of the country's small holdings, 64% are situated around Pretoria and the Witwatersrand as far as Vereeniging; in other words, 56,058 of the country's 87,202 small holdings are in this area.

4. In country towns conditions are atrocious. Where abattoirs exist, butchers alone make use of them, while a great deal of slaughtering of sheep, pigs and cattle is done in the back-yard with local dogs doing the mopping up and eating meat which is given to them because it appears not fit for human consumption. This may be hydatid-infected meat, the pig and cattle also acting as intermediate hosts. In spite of the health inspector, meat of any description is clandestinely or openly hawked in the town and its location. I know of several farmers who have hawked carcasses of sheep which had died from *malkopsiekte*, i.e. hydatid of the brain and head, in the town and location in the belief that the head of the sheep is alone affected by this disease, when as a matter of fact the whole carcass is riddled with it.

5. Far too many dogs are kept in the country districts, and in towns as a whole, particularly in locations, where the unskilled African labourer though he can hardly afford to feed his family, still keeps more than one dog. The locations are overrun by underfed dogs which, singly or in packs, often joined by dogs from the town, raid and wantonly kill the sheep on farms.

6. Up-and-coming progressive young wealthy farmers have capitalized on the post-war wool boom, practising

improved methods of farming, so that the capital investments of the farmers in South Africa stand today at £20,000 million. They have built sumptuous dwellings on their farms with all the necessary and most modern conveniences formerly denied to them because of adverse and unstable farming trends. The homesteads are further adorned with spacious evergreen lawns and terraces of flower gardens interspersed. Convenient spaces are set aside for recreation and relaxation for adults and children, for they have set out to live comfortably and bring up children to the best of their ability, and in the tradition of their forefathers. Yet they are oblivious of the threat of hydatid disease, particularly to their children, which is presented by the infected dogs on the farm and by their pet dogs which, having the run of the house, play where the other farm dogs have polluted the ground.

The parents of children, especially stock farmers, should be on their guard concerning their children and dogs because, in humans, infection usually occurs at an early age, from 4 to 12 years, when a child becomes very attached to a dog and has not yet acquired those habits which might safeguard him against the hydatid infestation of which the dire results may not manifest themselves until many years later. As a student I witnessed in Groote Schuur Hospital a craniotomy performed by the late Mr. T. Lindsay Sandes on a highly-ranked employee of a commercial bank, a man in his early forties who had grown up on a sheep-raising farm in his youth. He was struck down by attacks of symptomatic epilepsy caused by hydatid disease of the brain. The skull was opened by turning down a flap of bone and cysts came away from his brain like grapes or gelatinous bubbles resembling snails; hence I presume the Afrikaans description of it as *slaksiekte*.

7. The echinococcal infection comes with the dogs which the farmers bring with them to the seaside and other holiday resorts. The infected dogs foul the beaches and lawns with their faeces, and in this way children playing there may be directly infected, or uninfected dogs may pick up the ova on their coats, paws and skins and take the infection home to their owners. In this way infection is brought from the farms to the seaside resorts throughout the coast of South Africa. Many farmers have their own seaside houses, to which they take their dogs.

A disquieting feature of this farmdog-man relationship is the indifference and total disregard for the preventive aspect of hydatid disease on the part of the laity and medical people alike. For instance a physician I know, who lives in the Karoo just inland from a small seaside resort, comes on weekends down to the sea with his wife and small children and often squeezes the huge family dog into the already overcrowded car.

8. Sheep raising however, has its adversities. There is for instance the loss of sheep due to stock diseases, which is fortunately very satisfactorily countered by the ever vigilant and resourceful Veterinary Research Station at Pretoria. But sheep loss due to their destruction by wild animals constitutes the major problem to the stock farmer, 600 sheep being lost this way daily in the Union. The animals more generally accepted as responsible for this killing of sheep are silver fox, jackal, underfed dogs and in mountainous areas, leopards, cheetahs, wild baboons and wild cats. The farmer's dogs are an essential in the campaign against these animals.

The silver fox remains public enemy number one to the sheep farmer who has even gone so far as to have the confines of his farm enclosed by vermin-proof wire-netting fencing, an ideal counter to preserve his flock of sheep, which also prevents his stock from straying or being chased away. It is, however, an expensive undertaking and not all farmers are financially strong enough for such a capital expenditure.

A special Act of Parliament is in force which makes credit available through the Land Bank to farmers for fencing their farms with vermin-proof fencing. There are branches of the Bank at Cradock and Beaufort West, the richest and best sheep-farming districts in the Union. At the beginning it was a very expensive undertaking, the outlay on fencing at times exceeding the value of the farm; but the far-sighted objective has fully justified itself, making farming easier, preventing soil erosion, and checking the activities of the silver fox and other destructive animals. However, despite the great number of farms fenced in this way and the capital expenditure on vermin-proof fencing, the silver fox remains the greatest menace to the sheep farmer, his killing of sheep going on unchecked. His exploits are legendary and it is now believed that he can climb over the wire netting of a fence. The fact remains that no satisfactory device has been devised to foil the fox. The only reliable and effective method is to use the dog for tracking the fox to its lair, to destroy the whole litter or to hunt it in the open with dogs.

Organized campaigns are permanently maintained by agricultural bodies with the support of the Government, and a fee is paid for the skin of a silver fox.

Each district in the Union is divided into several Jackal Clubs and a dog registered in the Club is exempt from dog taxation. Dogs are specially kept and bred on farms for this purpose, including greyhounds, fox-terriers and others. Dogs kept by the farm hands are also registered along with the farmer's dogs in the Club books and are tax free.

SUMMARY

The object of this article is to demonstrate the danger in South Africa of hydatid disease conveyed to man by dogs infected with echinococcal tapeworm or contaminated with its ova. Emphasis is laid on the part played by sheep-farm dogs and dogs whose coats, paws, etc., have been contaminated with their faeces.

The sheep being the intermediate host, the growth of sheep farming in this country has promoted the spread of the disease.

The morphology and pathology of the disease are briefly described, as well as its treatment and preventive measures. Other factors contributing to its incidence are referred to, including farming operations on small holdings in peri-urban areas, and the uncontrolled slaughtering of sheep, pigs and cattle in country towns.

Stress is laid on the unhygienic contact that takes place between dogs and members of their owners' families, and the increased risk of the spread of hydatid disease that arises from the practice of bringing dogs from sheep farms to seaside and other holiday resorts.

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HYALURONIDASE IN SURGICAL DISSECTION

J. KATZ, M.B., F.R.C.S.E.

Non-European Hospital, Johannesburg

Since the discovery, as long ago as 1929, of a 'spreading factor' extracted from normal testicle, this material has been used for many and varied reasons. The possibility of using hyaluronidase as an aid to surgical dissection struck us as feasible, and when this was confirmed by an article by M. A. Streuter¹ in 1953 we decided to give it a trial.

The material of this survey consisted of a hundred consecutive operations requiring dissection, at the Non-European Hospital, Johannesburg. The striking features of most of these cases, when compared to a similar series of European cases, were the advanced stages of the disease for which surgery was indicated and the marked fibrosis so characteristic of the Bantu. These factors often make ordinary dissections hazardous and it was felt that any aid to overcome these difficulties would be welcome.

Hyaluronidase is an enzyme which acts on hyaluronic acid, which is a mucopolysaccharide present in animal tissues and serving as an intercellular cement substance. It has been widely used as an aid to the administration of subcutaneous fluid and in local anaesthesia.²

The solution used throughout this series of cases consisted of 3 ampules of hyaluronidase (Hyalase) dissolved in 5 c.c. of sterile water. Each ampule contained 1,000 Benger units or, in the more recent standard, 1,500 international units, and there were therefore 900 I.U. of hyaluronidase (Hyalase) in each c.c. of the prepared solution. This amount of solution proved sufficient in all the operations carried out in this series of cases, despite the fact that some of the dissections were very difficult and took over 2 hours to complete.

Into this solution, which was placed in a medicine glass and kept at theatre temperature, was dipped, as required, a Mayo swab clamped in the jaws of a Kocher's forceps, which was then used instead of dissection scissors. For purposes of comparison dry swabs and swabs soaked in normal saline, instead of the hyaluronidase solution, were used but proved ineffective.

CLINICAL ASPECTS

In this series of cases hyaluronidase was not used for acute infections on account of the danger of spread and it was felt that this was the only contra-indication to its use. Hyaluronidase was used in the following operations: Inguinal herniorrhaphies (27), mal descended testes (3), orchidectomies (2), dissection of lymph-nodes in the neck (10), in the groin (4) and in the axilla (1), Trendelenburg operations (6), thyroidectomies (11), plunging ranula (3), repair of umbilical hernia (5), breast operations (5), parotid tumours (7), hydrocoele of the tunica vaginalis (6), maxillary tumour (1), exploration of popliteal space (2), suture of nerves (2), tumour of scalp (1) nephrectomy (1), lipoma of foot (1), tumour of thigh (1), neurofibroma (1).

In the series there were 5 cases of chronic tuberculosis, 1 of fungal infection and 13 of malignant neoplasm. There were 14 operations on children as follows: Ectopic testes (2), umbilical hernial repairs (3), inguinal herniotomies (2), and 1 each of the following: Plunging ranula, nephrectomy (nephroblastoma), tuberculous glands in the neck, neuro-

fibroma in the elbow region, thyroglossal cyst, hydrocoele, and parotid tumour.

In two cases of bilateral inguinal-hernia repair, two teams of surgeons operated, one team using hyaluronidase and the other the standard technique. In both cases it was noted that the team using the hyaluronidase technique completed the operation more rapidly and that there was less loss of blood. The wounds healed equally well and there appeared to be no difference in the scars. The post-operative course of all patients with regard to wound healing was uneventful. There was no delayed healing or apparent weakening of the scars.

DISCUSSION

In surgical dissections of diseased tissues the demonstration of intervening tissue planes is often difficult and in this respect the use of hyaluronidase as an aid to dissection proved of great value. This was most notable in our series of herniorrhaphies and block dissections of the neck; in the latter particularly it was the only way in which the internal jugular vein could be saved on several occasions, because of concomitant fibrosis.

The loss of blood was less in that small veins could be separated from the surrounding fibrous tissue and clamped. On no occasion was a vessel torn by the blunt dissection and damage to tissue was considerably lessened.

In several cases it was felt that an apparently inoperable case was made operable by the use of hyaluronidase and in all cases it was felt that the operation was made simpler for the surgeon and less damaging to the patient.

It will be seen that hyaluronidase was used in several cases of chronic inflammation (tuberculosis) and in malignancies of parotid, thyroid, kidney, and breast. It aided greatly in the ease of the operation, and the time taken; it was noted that up to the present (approximately 1½ years), no differences have been seen in the healing of the wounds or in the recurrence or spread of the inflammatory processes and tumours.

SUMMARY AND CONCLUSIONS

1. A method is described of using hyaluronidase as an aid in surgical dissection.
2. Hyaluronidase facilitates the separation of closely-adherent vital structures, and makes surgical dissection simpler and more effective.
3. The substance has no deleterious effect on tissue healing or bleeding.
4. It has been used in chronic inflammatory and malignant conditions, without apparently altering the prognosis (1½ year follow-up).
5. Its use has been of equal value in both children and adults.

I wish to thank Dr. P. Keen for permission to operate on the patients with the hyaluronidase technique, and for his advice and help in preparing the article for publication; also to Mr. R. D. Smith, of Benger laboratories, to Dr. G. Abrams, and to several generations of interns.

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ASSESSMENT OF THE BRITISH VACCINE AGAINST POLIOMYELITIS*

The Poliomyelitis Vaccines Committee of the Medical Research Council have issued a report on a controlled vaccination programme carried out in England, Wales and Scotland during May and June 1956. The investigation was based on 148,684 vaccinated children, of whom about half consisted of school-children aged, roughly, 5½-9½ years and half of pre-school children aged, roughly, 1½-5½ years, and who received two injections of the vaccine at an interval of not less than 3 weeks.

In 1955 a British formalized vaccine manufactured by similar methods to those used in the production of the Salk vaccine and incorporating the same three strains of poliovirus was being tested on adult volunteers, when the reports were received of the occurrence of poliomyelitis in the U.S. associated with certain commercial batches of vaccine. Further use of the formalized vaccine was, therefore, abandoned for the time in Great Britain. Subsequently it was decided to discontinue the use in the British vaccine of the virulent type I Mahoney strain used in the American vaccine and replace it as the type I component with the less virulent Brunenders strain. The same type II (MEF-1) and type III (Saukett) strains continued to be used.

This variant of the vaccine is now being used in Great Britain and the present investigation has been planned to assess the protective effect of this vaccine, especially in younger pre-school children, who have the highest rates of paralytic poliomyelitis in Great Britain.

The details of the investigation programme and its results are set out in the report† (together with 8 statistical tables), and are summarized below in 'summary and conclusions' taken from the report:

SUMMARY AND CONCLUSIONS

'1. In the autumn of 1955 a British formalized vaccine containing the Brunenders type I, MEF-1 type II, and Saukett type III strains was put into production, and early in 1956 the Ministry of Health and Department of Health for Scotland announced a vaccination programme for children born in the years 1947-54. Through the local health authorities parents of these children were invited to register them for vaccination.

'2. It was anticipated that the demand would greatly exceed the supplies of vaccine that could be produced in the limited time available before the onset of the 1956 epidemic season. The efficacy of vaccines incorporating the Brunenders strain and the protection conferred by vaccinating children of pre-school age had not been previously measured. In these circumstances of scarcity, therefore, the opportunity was taken of issuing the vaccine in such a way as to allow its protective value to be scientifically assessed.

'3. All but two of the local health authorities in England, Wales and Scotland took part in the scheme and nearly two million children were registered for vaccination—almost one-third of the total number who were eligible.

'4. To secure two large and comparable groups of children, equivalent except in respect of vaccination, it was essential that the vaccine should be distributed without bias on a uniform and simple basis throughout the country. For this purpose the allocation was based upon the month of the year in which a child had been born. It was offered to the 95,723 registered children born in any November of the years 1947-50 and to the 98,687 registered children born in any November or March of the years 1951-4. For various reasons, 33,064 of these eligible children did not receive any injections. The defaulters born in November 1951-4 were sub-

sequently found to have a higher attack rate of paralytic poliomyelitis than unvaccinated children who were not eligible for vaccination. The remainder of the defaulters, those born in November 1947-50, and in March 1951-4, showed no such excess. It was considered, therefore, that this excess limited to one group was due to chance and had not biased the assessment of the vaccine.

'5. Vaccination was carried out by local authorities in their clinics from early May to the end of June 1956. Of the registered children born in March and November, 148,684 received the required two injections, with not less than 3 weeks between them. School and pre-school children each provided some 74,000. For comparison there remained over 1½ million registered children born in other months and for whom vaccine was not then available (children born in August were excluded from the comparison, since any supplies of vaccine surplus to the demands of March and November were distributed to them on any system that the medical officer of health found convenient).

'6. From the beginning of vaccination until January 1957 special returns were supplied by the local health authorities for every notification of poliomyelitis relating to a child under 10 years of age. Of these reports, 512 related to registered children, vaccinated or unvaccinated. Further details were then sought from general practitioners, hospital clinicians, and pathologists regarding each of these.

'7. Nearly 400,000 injections were given and there was no evidence that they had been accompanied by any risk. Of 6 cases of notified poliomyelitis that occurred within 30 days of an injection only 3 were paralytic and in none of them was the injected limb involved. Local reactions to vaccination were mild. No albuminuria or obvious excess of cells or casts was detected in an examination of specimens of urine from a small sample of children subsequent to vaccination.

'8. In the 74,660 vaccinated children born in 1947-50 and aged, roughly, 5½ to 9½ years who received two injections of vaccine, one case of paralytic poliomyelitis occurred, giving an attack rate of 1.3 per 100,000. The attack rate in the corresponding unvaccinated children was 8.2 per 100,000. At this latter rate 6 cases would have occurred in the vaccinated group in place of the 1 actually observed.

In the 74,024 children born in 1951-4, and aged, roughly, 1½ to 5½ years, who received 2 injections of vaccine, three cases of paralytic poliomyelitis occurred, giving an attack rate of 4.1 per 100,000. The attack rate in the corresponding unvaccinated children was 20.1 per 100,000. At this latter rate 15 cases would have occurred in the vaccinated group in place of the 3 actually observed.

In both age groups, therefore, the observed incidence of paralytic disease in the vaccinated children was only about one-fifth of the incidence in the unvaccinated.

'9. The incidence of illnesses reported as non-paralytic poliomyelitis appeared to be uninfluenced by vaccination.

'10. Although the number of observations is small there appears to be no doubt that the Brunenders strain incorporated in the vaccine conferred protection against type I infections prevailing in the community.

'11. There was insufficient evidence on which to judge the effect of one injection only.

'12. Owing to the shortage of vaccine and the very short time (6 weeks) in which to utilize supplies that were available the numbers of children who completed the course of 2 injections of vaccine (148,684) fell far short of the numbers originally hoped for. As a result it is not possible to assess with any real precision the degree of protection which was conferred by the vaccine. Since some cases of paralytic disease were observed in the vaccinated children, in the form in which it was given the vaccine did not offer complete protection. On the other hand it did confer some protection, which was probably quite substantial over the ages 1½ to 9½ years. If the small numbers available are taken at their face value the apparent protection conferred was very similar to that observed in the 1954 trial in the United States.

* Abstract from the *British Medical Journal*, 1 June 1957, p. 1271, by courtesy of the Editor.

† The members of the committee are: Prof. C. H. Stuart-Harris (chairman), Dr. T. Anderson, Dr. W. C. Cockburn, Dr. W. H. Bradley, Prof. G. W. A. Dick, Dr. J. A. Dudgeon, Prof. A. Bradford Hill, Dr. F. O. MacCallum, Dr. C. Metcalfe Brown, Dr. W. L. M. Perry, Dr. W. Ritchie Russell, Mr. H. J. Seddon, Prof. E. T. C. Spooner, Dr. I. N. Sutherland, Dr. G. S. Wilson, and Dr. J. Knowelden (secretary).

The Poliomyelitis Service has reported (6, 1956) a rate of 9.2 per 100,000 incidence of poliomyelitis vaccine. During 1956 were distributed which is just of the 60-65 States and Territories aged 20-40, required. The broad discussion and below.

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* The article at a meeting Chicago on Reports (W. Dr. N. N. Forester, sta

Medical research began with empirical that his aim of old. It re the structures underlying the With adva slowly took of ill-health underlying the Medical h undertaken

* Extracted from the Co government

SURVEILLANCE OF POLIOMYELITIS, UNITED STATES, 1956*

The Poliomyelitis Surveillance Unit of the US Public Health Service has published a survey of the poliomyelitis position in the US during 1956. In the year 15,400 cases of poliomyelitis were reported (6,768 paralytic, 5,918 non-paralytic and 2,714 unstated), a rate of 9.2 cases per 100,000 population. This is the lowest annual rate recorded since 1947, but because of wide annual variations in incidence it is not yet possible to attribute this to the use of poliomyelitis vaccine.

During 1955 and 1956 98.2 million doses of the Salk vaccine were distributed for use in the US (70.5 million doses in 1956), which is just over half enough to complete 3 inoculations for each of the 60-65 million persons under 20 years of age in the United States and Territories. To complete vaccination of the population aged 20-40, more than 100 million doses in addition would be required.

The broad results of the 1956 study are indicated in the 'discussion and summary' at the end of the report, which is reproduced below.

An interesting feature of the report is the experience obtained of vaccination during epidemic conditions (e.g. in Hawaii in late 1955). The biggest example quoted is that of Chicago, where during 1956 more than 1,100 cases were reported. During a period of rapidly rising incidence a large-scale mass vaccination programme was instituted in Chicago, and more than 1.5 million doses were administered in less than 2 months, too late, however, to produce any dramatic effect upon the epidemic curve. An analysis was made to demonstrate any possible provoking effects following this large number of inoculations, and this revealed no evidence that prior inoculation influenced the localization of subsequent paralysis.

DISCUSSION AND SUMMARY

The report concludes with the following discussion and summary:

'The experience in the United States during 1956 shows that poliomyelitis vaccine has been safe and effective. Several hundred cases of poliomyelitis occurred shortly after inoculation, but this many vaccine-associated cases could easily be coincidental in view of the more than 70 million doses of vaccine that were administered. The vaccine-associated cases had all the characteristics of naturally occurring poliomyelitis. There was slight, if any, evidence of untoward reactions from the vaccine. While the concepts of absolute vaccine safety or total absence of a provoking effect of inoculation are not scientifically tenable, the epidemiological

* The article here published is an abstract from a paper presented at a meeting called by the American Medical Association in Chicago on 26 January 1957 and published in *Public Health Reports* (Washington), May 1957 (72, 381). The authors were Drs. N. Nathanson, W. J. Hall, and L. D. Thrupp, with Helen Forester, statistician.

observations during 1956 indicated that any such hypothetical effects occurred at a frequency of less than one per million inoculations.

'During 1956 the effectiveness of the vaccine could not be evaluated in well-controlled field studies, such as Francis² conducted in 1954 or in large-scale comparison-group studies such as were made in 1955.³ It was necessary to depend largely upon qualitative studies and upon orderly epidemiological inferences based on careful observation and analysis. A number of independent studies consistently point to a level of effectiveness in preventing paralytic cases of 75%, with a large proportion of the vaccinated population having received less than the recommended course of 3 doses. The effectiveness of 3 doses, properly spaced, has not yet been fully evaluated, but the occurrence of several well-confirmed triple-vaccinated paralytic cases shows it to be less than 100%.

'Considerable evidence has accumulated to show that the present vaccine is less effective in preventing non-paralytic cases and in controlling the spread of inapparent infection. Two published studies^{4,5} as well as unpublished work of Lipson, Carver, and Robbins and of Davis and Melnick, have shown that vaccinated children in household contact with poliomyelitis cases can readily become infected, although, again, the effect of 3 doses has not yet been fully evaluated. Thus the primary effect of vaccine appears to be the prevention of invasion of the central nervous system and thereby the prevention of paralysis. This limitation on the effectiveness of the vaccine may be associated with the evidence that poliovirus did spread rather extensively in various populations during 1956, not only in Chicago, but in Louisiana, Utah, Idaho, California, and elsewhere. In spite of relatively widespread, but incomplete, vaccination, these populations experienced high incidence of disease, particularly among pre-school children in all socio-economic groups.

'The immediate public health implication of the experience in 1956 is that substantially higher levels of immunity must be achieved among all elements of the population.'

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THE CONCEPTION OF MEDICAL RESEARCH*

Medical research has been in progress from time immemorial. It began with man's first attempts to improve his food supply by empirical study of the roots and plants around him and to treat his ailments with the simples and concoctions of the witches of old. It received its greatest impetus when he began to examine the structures of his own body and, shortly afterwards, the principles underlying the functions of its component parts.

With advancing knowledge a concept of the normal or healthy body took shape, and the recognizable signs and symptoms of ill-health or disease became established. Finally, the factors underlying community health and disease received attention, and public health services began.

Medical research may be described as any work specifically undertaken to throw new light upon the factors underlying the

causation and alleviation of disease on the one hand and the maintenance and promotion of health on the other.

In that both man and animal owe their existence to certain common biological processes, it is natural that the fruits of animal research should be of extraordinary interest to man, and often directly applicable to the solution of his problems. Inevitably wherever possible our biological problems are translated to the animal world and the solutions there worked out in due course applied to ourselves. Indeed medical research is but a small specialized section of the wide field of modern biological research and it is for this reason that research methods, techniques and discoveries in all the biological sciences are so closely correlated and interwoven.

In this connection it should be noted that the term 'medical' today covers a much wider field than was generally accepted even a few decades ago, and in the modern sense it embraces not only the sciences that deal directly with human health and disease. It would be more in keeping with modern concepts to speak of

* Extracted from the Report of the Commission of Enquiry into the Coordination of Medical Research (U.G. 14/1957). Government Printer, Pretoria.

medical research' as in fact embracing research in all the medical sciences, i.e. all those that fall within the scope of medicine, dentistry and veterinary science.

TEAM WORK

Biological research at the present time draws largely for its ideas and advancement upon the discoveries and techniques of physics and chemistry. With each new discovery in these fields, new techniques become available for tackling the problems of biology, and medical research is becoming more and more the concern of groups of workers consisting of medical and non-medical scientists and technicians, so that team work is slowly replacing the efforts of those rare and often isolated individual workers who in the past established the foundation of medical science as we understand it today.

With the passage of time it has become increasingly evident that man's health depends upon the quality of both his body and his mind. Man as a whole consists of both body and mind, and each interacts with the other in an indivisible way. It is for this reason that animal research is of necessity limited in its application to man. It can only offer clues for the solution of his difficulties, and not the answers to his problems. In the end it is the direct study of man himself (clinical research) that provides the information required, and today doctor, scientist, technician, hospital authority, State and patient are, or should be, united as never before in the pursuit of a common purpose, namely the mastery of our environment.

Inevitably medical research has become a difficult, intricate, time-consuming, highly skilled, expensive business. Generally it cannot be undertaken in odd moments of leisure here and there. Research in hospitals to be fully effective requires money, specially built laboratories, expensive equipment and full-time research staff. Doctors of an enquiring turn of mind, with ideas and a

flair for research, must be appointed and encouraged, and hospital authorities must do their share in the provision of the necessary facilities.

If, on the other hand, research is not encouraged and subsidized, patients become the victims of routine service, often antiquated or obsolete, and their chances of recovery may be jeopardized. It is noteworthy that the public in civilized and informed communities is becoming increasingly aware of the need for responsible research in both public and private institutions, and is increasingly willing to collaborate.

In overseas countries as well as in our own there is today a wide-spread urge to create opportunity for proved research workers as well as for younger men and women with promising and original ideas to work in the best possible environment, unfettered by administrative restrictions and fostered by an authority whose scientific ability and capacity for coordination cannot be called into question.

DEFINITIONS

In the evidence before it the Commission has repeatedly encountered confusion arising out of an overlapping in clinical medicine of the concepts covered by the words 'investigation' and 'research'. To prevent misunderstanding it is intended for present purposes to use these words in the following sense. By 'investigation' is implied the making of observations upon the body and its tissues, specifically for the benefit of the individual concerned, and irrespective of the techniques employed. By 'research', on the other hand, is meant the making and use of such observations, not primarily for the sake of diagnosis and treatment, though these may benefit ultimately, but mainly for the purpose of discovering new facts, rejecting or supporting current theories or propounding new hypotheses.

NATIONAL GENERAL PRACTITIONERS' GROUP: MEDICAL AID FEES

Early in March this year, the Executive of the National General Practitioners Group attended meetings with representatives of the Medical Aid Societies and the Central Committee for Contract Practice of the Association, to discuss the proposed new schedule of fees for medical aid societies.

Although prepared to grant certain increases in fees for minor procedures, the aid societies felt that they were not in a position to accede to our request for an increase in consultation and visiting fees to 15s. 0d. and 17s. 0d., nor would they agree to the imposition of a week-end and public holiday fee for new calls. The reasons advanced for their refusal to increase these fees was that a large percentage of the members of these aid societies earned less than £600 per annum. In fact, the figures quoted by them indicated that 75% of their members earned a salary of less than £600 per annum. Increased visiting and consultation fees had been granted during 1956, and this had increased their expenditure by 19% and a further increase would force a number of the societies out of existence.

In regard to the week-end and public holiday calls, the aid societies had pointed out that it would be difficult for the societies to ascertain which calls had really been essential and could be charged for at the higher rate, and their feeling was that doctors would automatically charge all aid society patients the higher fee. They did not feel that they wanted to penalize patients who genuinely took ill over the week-end by making them pay for such visits.

The Medical Aid Societies have agreed that the new fees which

will come into operation as a result of the latest negotiations will be reviewed after 3 years, but the consultation and visiting fees for general practitioners are not included in this schedule and is open to negotiation at any time, with the approval of Federal Council.

A circular has been sent to all the sub-groups, asking for their members' views whether the National Group should press for a consultation and visiting fee of 15s. 0d. and 17s. 0d. for medical aid patients, and whether further negotiations should be entered into to persuade them to fall into line with private patients by paying an increased fee for week-end and public holiday calls (new).

A very important aspect of the work of the National Group will be discussed at the annual general meeting at Durban this year. It has long been felt that the present administrative executive of the National Group is called upon to make decisions for the group on matters of national importance (like fees) when the time factor does not permit of consultation with all the sub-groups. It therefore feels that the proposal to hold executive meetings immediately before Federal Council, when all the general practitioner members of Federal Council can act as representatives of the various sub-groups, should again be considered. Only in this manner can the Executive act as a truly national body, and the administrative work of the group can then be vested in any of the sub-groups.

Members are asked to give this proposal their earnest consideration. No alternation in the constitution will be necessary as provision for such consultation is made.

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UNIVERSITEIT VAN PRETORIA : FAKULTEIT VAN GENEESKUNDE

Die volgende grade is op die gradeplegtigheid van die Universiteit, Pretoria, toegeken:

Graad van Magister in Geneeskunde

Botha, Daniel Johannes (Dept. Chirurgie).
Jooste, Charl Fourie (Dept. Anesthesiologie).
Lombaard, Christiaan Mauritz (Dept. Chirurgie—Afdeling Neuro-chirurgie).

Sesjarige Baccalaureusgraad in Geneeskunde en Snykunde
Bekker, James, (in absentia)

Brits, Ockert Rudolph
Couzyn, Robert
Fontanive, Werner Willy (in absentia)
Gravett, George Charles
Neuberger, Waldemar Alexander (in absentia)
Oosthuisen, George Leslie
Pienaar, Ferdinand James
Smit Nicolaas
van der Laan, Frederik Lodewijk
van Rooy, Aletta
van Veenendaal, Rink

NEW PREPARATIONS AND APPLIANCES : NUWE PREPARATE EN TOESTELLE

Medication by Aerosol

The following information concerning medication by the Medihaler device has been supplied by Riker Laboratories.

The first self-propelling aerosols for inhalation therapy, pioneered by Riker Laboratories, are now available in South Africa; and with the exception of the plastic inhaler, are manufactured in this country as well. Thus South African enterprise has taken the lead over such countries as the United Kingdom and Australia, where this form of medication is not yet available.

The first two forms on the market are 'Medihaler-Epi' (containing 0.5% of Adrenalin, or epinephrine) and 'Medihaler-Iso' (containing 0.25% of Isoprenaline).

Most users obtain rapid relief of bronchospasm after a single inhalation. The most prominent feature of the Medihaler device is that each dose is exactly the same on each occasion, and that over 80% of mist particles are of optimal size.

As the solution cannot be spilled or exposed to light there is great economy in use. The standard 10 c.c. container gives 200 full inhalations, and the vial will therefore last most asthmatics 14 weeks—others much longer.

Full details of availability, packs etc. have been mailed to all registered medical practitioners, and are also available on application to the makers and distributors, Riker Laboratories Africa (Pty.) Ltd., P.O. Box 1355, Port Elizabeth.

* * *

The new Kleen-Spec Speculum

The Westdene Products (Pty) Ltd., P.O. Box 7710, Johannesburg, supply the following information: The Welch Allyn Kleen-Spec Disposable Speculum will prove indispensable to the busy practitioner, and particularly to the doctor doing routine tests on school children, factory hands, inmates of institutions, etc. Apart from saving the time-consuming procedure of sterilization, there is never any danger of cross-infection or any accumulation of soiled specula, and the permanent speculum is protected from soiling.

The whole process of using a Kleen-Spec Speculum for each patient takes less time than changing the old-style speculum.

The Disposable Speculum Adaptor No. 255 enables the Kleen-Spec Specula to be used on Welch Allyn otoscopes.

Units of 200 Kleen-Spec Specula are obtainable at 24/-, whilst

otoscope No. 250 or combination set No. 975, complete with 440 Kleen-Spec Specula, is also available.

Skopyl

Protea Pharmaceuticals Ltd. announce that this preparation, manufactured by Pharmacia Uppsala, Sweden, is now available in South Africa. The manufacturers supply the following information:

Skopyl brand of methyl-scopolamine nitrate, is a quaternary ammonium compound differing from scopolamine only in that the nitrogen atom has been methylated (quaternization). As a result of this change in structure, the peripheral anti-cholinergic effect is potentiated and the central inhibitory action, typical of scopolamine, is removed, which is of importance in the therapeutic use of Skopyl as an antispasmodic.

The main effect of Skopyl is peripheral and is due to inactivation of acetyl choline, the transmission of impulses from the parasympathetic nerve to the end-organ thus being blocked.

Skopyl has a more marked heart-vagus effect than atropine, and the same mydriatic effect as scopolamine. It stimulates the central nervous system but in therapeutic doses the stimulant effect is only very slight.

Skopyl is indicated in children with hypertrophic pyloric stenosis, infantile dyspepsia, and pertussis; in adults with peptic ulcer, spastic colon, renal and biliary colic, night-sweats and hyperhidrosis, hyperemesis gravidarum, spasmodic dysmenorrhoea, persistent hiccough, and incontinence of urine due to increased detrusor tonus.

Side-Effects. The action of Skopyl on the vagus may result in tachycardia, but no cardiac complications have been reported. Signs of central excitation may occasionally be seen in sensitive subjects, but these are always easily counteracted by small doses of a barbiturate.

Administration and Dosage. Skopyl-brand methyl-scopolamine nitrate is available in the following forms: Skopyl tablets of 0.5 mg., Skopyl mite tablets of 0.1 mg., and Skopyl solution containing 2.5 mg. in 1 ml. The dosage is one 0.5 mg. tablet 3-4 times a day. Half of this dose will often be sufficient, although isolated cases may require up to twice as much. The tablets should be crushed in water and should be given half an hour before food. In children smaller doses are of course advised, varying with age, and Skopyl solution is preferred for children to the Skopyl mite tablets; the dose of the solution should not exceed 18 drops in 24 hours.

PASSING EVENTS : IN DIE VERBYGAAN

Dr. Lewis S. Robertson has been re-elected Chairman of the Johannesburg Hospital Board.

Dr. H. J. Hugo, M.A., M.D., Medical Director of Hospital Services in the Transvaal, will be leaving for Europe on 26 July for six months on a World Health Organization Fellowship to study the subject 'The Medical Uses of Atomic Energy'. He will be visiting Switzerland, Sweden, Great Britain and America. Dr. Hugo will be accompanied by his wife, Dr. Nan Hugo.

Mr. F. M. Sparrow, M.B., Ch.B. (Cape Town) D.P.H., D.T.M. and H. (Rand), F.R.C.S. (Edin.), has commenced practice as a Specialist Surgeon in Strathmore House, Boon Street, Klerksdorp.

Mr. H. Gaylis, Ch.M., F.R.C.S., has left for Boston to take up an appointment as Clinical and Research Fellow in Surgery at the Massachusetts General Hospital and Harvard University.

Dr. Max Chitters, M.B. B.Ch. (Rand), M.R.C.P. (Lond.), of Johannesburg, is attending the International Congress of

Dermatology at Stockholm. He will return to Johannesburg on 9 August 1957.

Union of South Africa. Department of Health. Notification of formidable epidemic diseases and poliomyelitis in the Union during the period 21-27 June 1957.

	Poliomyelitis				
	Eur.	Nat.	Col.	As.	Total
Transvaal ..	1	4	—	—	5
Cape Province ..	4	2	4	—	10
Orange Free State ..	—	1	—	—	1
Natal ..	—	1	—	—	1
Totals ..	5	8	4	—	17

Correction: One (1) European case (Cape Province) notified during week ended 21 March, 1957, subsequently diagnosed as not Poliomyelitis.

Plague, Smallpox, Typhus Fever: Nil.

REVIEWS OF BOOKS : BOEKRESENSIES

PHYSIOLOGY OF GASTRIC DIGESTION

Monographs of the Physiological Society. The Physiology of Gastric Digestion. By A. H. James, D.M. (Oxon.), M.D. (Toronto), B.Ch., M.R.C.P. Pp. xi + 192. 54 Figures. 28s. net. London: Edward Arnold (Publishers) Ltd. 1957.

Contents: Preface. I. The Nature of the Gastric Contents in Man. II. The Acidity of the Gastric Contents. III. The Inorganic Components of Gastric Secretion. IV. The Mechanism of Acid Secretion. V. The Gastric Mucosa. VII. Function of the Gastric Musculature. VIII. Gastric Sensation. Appendix. Author Index. Subject Index.

This fourth monograph of the Physiological Society is the first to be written by a clinician but its approach, like that of its predecessors, is predominantly scientific. The practising physician or surgeon will get little practical guidance from the book but it provides the scientist with a comprehensive review of modern work on gastric secretion. Experimental techniques adopted by the various investigators are described in some detail and the results are critically analysed. Closely related phenomena such as gastric sensation and movements receive brief comment but the subject of gastric absorption is excluded.

The author's standard of scholarship is high and his presentation is clear. The book is well produced and each chapter ends with a

useful list of references. It forms a valuable contribution to the science of gastro-enterology.

A.W.S.

DISEASES OF CHILDREN

A Synopsis of Children's Diseases. Second Edition. By John Rendle-Short, M.A., M.B., M.R.C.P., D.C.H. Pp. xii + 624. 35s. post 8d. Bristol: John Wright & Sons Ltd. 1957.

Contents: Preface. Part I. The Healthy Child. Part II. The Sick Child. I. General Factors. II. The Neonatal Period. III. The Infectious Diseases. IV. Diseases of Nutrition. V. Diseases of the Respiratory System. VI. The Alimentary System. VII. The Cardiovascular System. VIII. Diseases of the Nervous System. IX. Psychological Disorders. X. Diseases of the Genito-Urinary System. XI. Diseases of the Blood. XII. Diseases of Lymph-Nodes. XIII. Diseases of Liver and Biliary System. XIV. Diseases of Bone and Joint. XV. Diseases of Muscles. XVI. Diseases of Skin. XVII. Diseases of Endocrine System. XVIII. Allergic Diseases. XIX. Inborn Errors of Metabolism. XX. Venereal Diseases. XXI. Accidents in Childhood. Appendix I. Dosage of Drugs. Appendix II. Clinical Pathology in Children: Normal Values. Appendix III. Incidence of Some Genetically Determined Conditions. Index.

This is one of the mighty midgets. Its format is that commonly used in books giving summarized information, with no serious attention paid to the literary aspect. Facts and beliefs are the main things and the amount of these packed into this small volume is almost

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incredible. The compilation of a synopsis of the diseases of childhood is no mean feat for any one man and when, as with this one, parts have been re-written within 3 years of the production of the first edition, the ordinary mortal is led to wonder how it was accomplished.

It would be difficult to find much fault with this volume. The information is impressively up-to-date and the scope of the contents is wide. There is a vast amount of detail, classified for each subject so that it is readily found. The index is also full and accurate.

The contents include the whole gamut of disease in childhood arranged in chapters of varying length. Sometimes this gives the impression that the subject matter of successive sections is not related, for instance in the consideration of the renal tract, where in fact the common factor in several chapters is infection, though this is not apparent when they are separated on an embryological or an anatomical basis. The highly peculiar modern tendency to miscall the manifestations of rheumatism makes a regrettable appearance. Rheumatic fever is a very definite entity, but is only one of the rheumatic group of diseases, and there is no such thing as a chronic form of it. Otherwise the accuracy of the text is of a high degree.

For those who will be satisfied with the presentation of paediatric knowledge in condensed form, in great detail but with no frills, and at a very reasonable price, this is the answer.

F.J.F.

POSTURE AND RELAXATION

Postural and Relaxation Training in Physiotherapy and Physical Education. By John H. C. Colson, F.C.S.P., M.S.R.G., M.A.O.T. Pp. ix + 105. 12s. 6d. net. London: William Heinemann—Medical Books Ltd. 1956.

Contents: Foreword. Preface. Part 1: Re-education of Posture. 1. Postural Defects. 2. Postural Training. 3. Postural Training Tables for Children. Part 2: Relaxation Training. 4. Indications for Relaxation Training. 5. Training Techniques. 6. So-called Psychosomatic Tension States. Index.

The author of this small and useful book is well known for his writings on remedial exercise and, although this book contains no new or novel methods, the author maintains his excellent standard.

The work is designed primarily for physiotherapists, remedial gymnasts, and physical educationists. It is written on a simple formula which is based upon well tried and accepted methods.

The problem of imbalance of posture in the growing child and young adolescent requires for its solution the same processes as all other medical problems, viz. accurate diagnosis and careful treatment. The cause of the postural defect must be elicited by the medical attendant and passed on clearly and simply to the medical auxiliary who is to carry out remedial correction.

Remedial exercises for the correction of postural defects in children must fulfil certain essential criteria, as follows: (1) Simplicity. (2) The exercises should be such that they can be carried over into the child's day. (3) Free swinging repetitive exercises are of little value in postural correction. (4) Accent should be on 'key muscle' localization and static contraction. (5) All this fails if the child fails to build up to the somatic image of correct postural attitudes.

The chapter on relaxation is based upon Jacobson's 'progressive relaxation' and is succinctly and simply described.

The last chapter is an explanation of the psychological mechanism of tension states.

Mental hospitals use methods of relaxation both individually and in group therapy; it is therefore essential for the medical auxiliary to gain some insight into the cause of the conditions which she is called upon to treat.

An essential point must be emphasized here—the medical auxiliary is taught treatment only and not diagnosis. She is entitled to expect a clear, accurate and simply worded diagnosis in order to carry out the skills for which she has been trained.

A well written and well illustrated book.

C.W.C.

ESSENTIALS OF SURGERY

The Essentials of Modern Surgery. Fifth Edition. By R. M. Handfield-Jones, M.C., M.S., F.R.C.S. and Sir Arthur E. Porritt, K.C.M.G., C.B.E., M.A., M.Ch., F.R.C.S. Pp. xv + 1276. With 649 Illustrations of which many are in colour. 75s.

net + 2s. 10d. Postage Abroad. Edinburgh and London: E. & S. Livingstone Ltd. 1957.

Contents: I. Inflammation and Repair. II. Infection and Community. III. Non-specific Infections. IV. Specific Infections. V. Venereal Diseases. VI. Tumours and Cysts. VII. Wounds and Burns. VIII. Haemorrhage and Shock. IX. Ulceration and Gangrene. X. General Surgical Technique. XI. Chemotherapy. XII. Physical Methods in Surgery. XIII. Diseases of the Skin. XIV. Infections of the Fingers and Hand. XV. The Surgery of the Blood Vessels. XVI. The Diseases of the Lymphatic System. XVII. The Face, Lips and Jaws. XVIII. The Mouth, Palate, Tongue and Salivary Glands. XIX. The Surgery of the Neck. XX. The Ear. XXI. Affections of the Nose and Accessory Sinuses. XXII. The Pharynx and Oesophagus. XXIII. The Larynx. XXIV. The Chest. XXV. The Breast. XXVI. The General Surgery of the Abdomen and Peritoneum. XXVII. Hernia. XXVIII. The Stomach and Duodenum. XXIX. The Small and Large Intestine. XXX. Intestinal Obstruction. XXXI. The Rectum and Anal Canal. XXXII. The Diseases of the Appendix. XXXIII. The Liver and Biliary System. XXXIV. The Pancreas and the Spleen. XXXV. The Kidney and Ureter. XXXVI. The Bladder, Prostate and Vesicles. XXXVII. The Penis and Urethra. XXXVIII. The Testis and Spermatic Cord. XXXIX. Diseases of the Female Genital Organs. XL. Diseases of the Scalp and Skull. XLI. The Brain and its Coverings. XLII. Diseases of the Spine and Spinal Cord. XLIII. Injuries and Diseases of the Nerves. XLIV. Injuries of Bones and Joints. XLV. Injuries of the Upper Limb. XLVI. Injuries of the Lower Limb and of the Spine. XLVII. Diseases of Bone. XLVIII. Diseases of Joints. XLIX. Deformities. L. Diseases of the Muscles, Tendon Sheaths and Bursae. LI. Amputations. Index.

This well-known text-book for students has now reached its 5th edition since it first appeared in 1938: this alone is a measure of its well-deserved popularity. The two editors are responsible for most of the chapters, but there is an impressive list of 14 additional contributors including Sir Gordon Gordon-Taylor, Julian Taylor and A. Dickson Wright.

Large portions of the book have been completely revised in this edition, particularly the chapters on fractures, radiotherapy, otolaryngo-laryngology and deformities.

The book is extremely well produced on excellent paper and the 649 illustrations add considerably to its educational value. It is provided with a comprehensive index which makes reference work very easy indeed.

In these 1,247 pages one finds a short account of general surgical conditions and in addition chapters on diseases of the ear, nose, throat, chest, bones and joints, urology, gynaecology, neurosurgery, fractures and deformities. To achieve this is a commendable feat and the undergraduate will find this a great advantage. But such condensation must necessarily result in a barely adequate description of most conditions, which can, however, be overcome by amplifying the various sections from information obtained at lectures and tutorials. From this point of view the book can be recommended to all undergraduate students.

D.J.duP.

MEASUREMENT OF BODY RADIO-ACTIVITY

British Journal of Radiology—Supplement No. 7.—The Measurement of Body Radioactivity. Papers read at a Conference held at Leeds on April 16-17, 1956. With a foreword by Professor F. W. Spiers, D.Sc. Editor: C. B. Allsopp. Pp. vi + 130. Illustrations. 25s. Post Free (30s. with cloth cover). Each member of the British Institute of Radiology is entitled to one copy at a special price of 21s. (26s. with cloth cover) on application to the Institute. London: British Institute of Radiology. 1957.

Contents: Foreword, by Professor F. W. Spiers. Part I. *High Pressure Ionization Chambers.* Some Swedish Investigations of the Radio-activity of the Human Body, by Rolf M. Sievert and Bengt Hultqvist. The Use of the Copenhagen Ionization Chamber Apparatus in the Study of Thorium Dioxide Poisoning by J. Rundö. Body Gamma-ray Monitoring: Some Basic Considerations, by P. R. J. Burch. Part II. *Scintillation Counters.* The Los Alamos Human Counter, by E. C. Anderson. Measurement of Whole Body Radio-activity with Na-ITl Scintillation Counters, by R. B. Owen. The Use of NaI-Tl Crystal Spectrometers in the Study of Gamma-ray Activity *in vivo*: A Summary of Developments at the Argonne National Laboratory, by L. D. Marinelli. Part III. *Natural Occurrence of Radium in Man and in Water and in Food.* Natural Occurrence of Radium 226 in Human Subjects, in Water and in Food, by John B. Hursh. Measurements of Normal Radium Burdens, by H. Muth, A. Schraub, K. Auran, and H. J. Hantke. Part IV. *Investigation of the Radioactivity of a Radium Worker. Case Report:* Death from Leukaemia in a Radium and Radon Worker, by John D. Abhatt. The Distribution of Radium in Certain Bones from a Man Exposed to Radium for Thirty-four Years, by Margaret Hindmarsh and Janet Vaughan. Measurements of Body Radioactivity in a Radium Worker, by F. W. Spiers and P. R. J. Burch. Autoradiograph Measurements of the Bones of a Radium Worker, by J. Rotblat and Filian Ward. Measurements of Radioactivity in a Radium and Radon Worker, by R. C. Turner and W. Anderson. Table of Collected Results for the Radioactivity of a Radium Worker. Part V. *Excretion Methods.* The Application of Excretion Analyses to the Determination of Body Burden of Radioactive Isotopes, by Wright H. Langham. The Importance of Radon and its Decay Products in Relation to the Normal Radiation Dose in Humans, by A. Schraub, K. Auran and W. Jacobi. The Measurement of Radon in Breath as a Control for Radium Workers, by W. P. Grove and B. N. Clack. Appendices. Determina-

tion of the Radio-caesium Content of Contemporary Man. I. Measurements made on Subjects at Harwell, by J. Rundo. II. Measurements made on Subjects in Leeds, by P. R. J. Burch, P. M. Bird and F. W. Spiers.

This volume is perhaps the most outstanding supplement of that world-renowned series produced by the British Journal of Radiology.

Its stature stems not only from the contributors—leaders in this field—such as Sievert, Hultqvist, Marinelli, Vaughan, Spiers, Grove, Schraub and others, but also particularly from the fact that their contributions, great as they are as personal ones, represent original research undertaken and sponsored by the most important yet diverse institutions in the world. The publication therefore bears the stamp of authority, for it emanates from such establishments as Harwell, Max Planck Institut für Biophysik, Frankfurt-am-Main, The Nuffield Institute of Medical Research, Los Alamos Scientific Laboratory, to mention a few.

Apart from the excellence of the individual contributions a most pleasing feature is the way the various chapters written by authors so widely separated have dovetailed and preserved the full sequence of thought so admirably planned for the Conference.

Most of the contributors are physicists or biophysicists and the subject matter they handle is highly technical. The central theme is the problem of body radio-activity and the consideration of external methods of measuring it. Obviously the early parts of the Conference were devoted to the production of equipment whose sensitivity was such that the natural level of radiation from human subjects could be observed. This involves the establishment of a low-background laboratory such as the one in Stockholm built underground in solid rock, hundreds of tons of Thames water having been used to filter off all the gamma radiation from the surrounding rock.

The equipment and methods discussed were not limited to whole-body measurements. The papers covered investigations into the natural occurrence of radio-active elements in man, in food and in waters; the distribution of these elements in the bones and tissues of the body; and the 'application of excretion analyses to the quantitative estimation of the body burden of radio-active isotopes'.

Patient and persistent study of the supplement even by those who are not biophysicists is most rewarding.

G.M.G.

CARDIOLOGY: A CONGRESS REPORT

World Trends in Cardiology. Volume I. Cardiovascular Epidemiology. Edited by Ancel Keys, Ph.D. and Paul D. White, M.D. Pp. x + 193. 41 Figures. \$4.75. New York: Paul B. Hoeber, Inc. 1956.

Contents: Contributors. Foreword. *Part I. Epidemiology of Atherosclerosis.* 1. International Cardiovascular Epidemiology: Introductory Remarks, by Paul D. White. 2. Problems and Challenges, by Ancel Keys. 3. Wartime Lessons on Atherosclerotic Heart Disease from Northern Europe, by Gunnar Björck. 4. Analysis of 10,000 postmortem Examinations in Japan, by Noboru Kimura. 5. Atherosclerosis, Diet, and Serum Cholesterol in the South African Bantu, by John Higginson. 6. Incidence of Coronary Disease in Population Groups in England, by J. N. Morris. 7. Field Studies in Italy, 1954, by Ancel Keys. 8. Clinical Studies in Italy, 1954, by Paul D. White. 9. Discussion: Further Studies in Sweden by Gunnar Björck. 10. Discussion: Heart Disease in Iraq, by M. A. Jalili. *Part II. Epidemiology of other Cardiovascular Diseases.* 11. Mortality from Rheumatic Heart Disease and Cardiovascular Disease in Italy as Compared to the U.S.A., by Vittorio Puddu. 12. Discussion: Rheumatic Heart Disease in Sweden, by Gunnar Björck. 13. Hypertension, by Alberto C. Taquini. 14. Discussion: Hypertension in Mexico, by Ignacio Chavez. 15. Congenital Heart Disease, by Paul D. White. 16. Cardiovascular Syphilis, by Bruce Webster. 17. Cor Pulmonale, by Gordon S. Myers. 18. Endomyocardial Fibrosis, by J. N. P. Davies. *Part III. Other Papers Relating to Cardiovascular Epidemiology.* 19. Studies on the Nature and Origin of Fibrinoid, by Lewis Thomas. 20. Methods for the Experimental Production of Generalized Atherosclerosis in the Rat: The Paul D. White Lecture, by M. R. Malinow, D. Hojman, and A. A. Pellegrino. 21. Diet and Coronary Heart Disease, by Ancel Keys. 22. Experimental Studies of Atherosclerosis, by George V. Mann. 23. Statistical Findings of the Incidence of Coronary Heart Disease in Japan, by Akira Kusakawa. *Appendix.* 24. Selected Vital Statistics, by Ancel Keys and W. Norris Schulz. 25. Field Studies in 1955: A Postscript, by Ancel Keys. 26. Discussion, by Paul D. White. Index.

This is the first of 5 volumes which make up selected papers from the Second World Congress of Cardiology and the 27th Annual Scientific Session of the American Heart Association, held in Washington in 1955. The difficulty of reports of this nature is that by the time that they have reached book form, so much newer information is available that the book is outdated.

In the first part of this volume, the incidence of arteriosclerotic heart disease in Scandinavia is outlined, with particular reference to the effect of war-time conditions on the incidence of coronary thrombosis. The rapid fall in death rate during the war, with the

quick return to pre-war levels after the cessation of hostilities, is associated with a marked change in the dietary habits during the period of war, particularly with respect to consumption of total fats.

A presentation from Japan follows, emphasizing the low incidence of atheroma in the average Japanese town and city dweller. The equally intriguing low incidence of aortic atherosclerosis in the Bantu is presented in a paper from Johannesburg, again emphasizing the low fat-content of the diet of this particular group of the population. The incidence of coronary disease in Italy, Naples and Bologna, is compared with a similar group in America, the disparity in incidence being attributed to the differing amounts of fat consumed by the three population groups.

The next section on the epidemiology of heart diseases, such as rheumatic heart disease, hypertension and cor pulmonale, are poorly discussed. A good account of endomyocardial fibrosis as it occurs in Kampala is given, with a review of the literature. The volume ends with a postscript on work done on the study of atherosclerosis since the Congress, which includes a report on the different racial incidence of the disease as it occurs in the 3 population groups in Cape Town, based on the work done in the Department of Medicine at the University of Cape Town.

V.S.

World Trends in Cardiology. Volume II. Cardiovascular Surgery. Panel Discussions. Edited by Helen B. Taussig, M.D. and Arthur S. Cain, Jr., M.D. Pp. viii + 65. \$2.00. New York: Paul B. Hoeber, Inc. 1956.

Contents: Contributors. Foreword. *Panel I. Medical Aspects of the Surgical Treatment of Congenital Heart Disease.* Helen B. Taussig (Chairman). Maurer Campbell. M. Durand. Stanley Gibson. Rodolfo O. Kreuzer. H. A. Snell. Patent Ductus Arteriosus. Tetralogy of Fallot. Coarctation of the Aorta. Pure Pulmonary Stenosis. *Panel II. Surgical Treatment of Congenital Heart Disease.* Alfred Blalock (Chairman). Sir Russell C. Brock. Robert E. Gross. C. Walton Lillehei. Jean Mathew. Clemente Robles. Atrial Septal Defects. Coarctation of the Aorta. Patent Ductus Arteriosus. Pure Pulmonic Stenosis. Tetralogy of Fallot. Controlled Cross Circulation. *Panel III. Surgical Treatment of Non-congenital Heart Disease.* Robert E. Gross (Chairman). Heim de Balsac. Robert P. Glover. Charles A. Hufnagel. Samuel A. Levine. J. K. Maddox. The Development of Cardiac Surgery. Aortic Valvular Disease. Mitral Stenosis. Pericardial Constriction. Aneurysm of the Aorta. Index.

In this volume the composite views of leading cardiologists in Britain, Europe and the Americas are discussed. The surgical indications for operation on patent ductus arteriosus is discussed, with a note on the operative mortality and the accuracy of diagnosis. Tetralogy of Fallot, coarctation of the aorta and pure pulmonary stenosis are discussed by a group of physicians who are mainly concerned with the indications for surgery and the post-operative results available at the time of the session.

The second part of the book is a report by a panel of leading cardiovascular surgeons, many of whom have introduced the current methods of surgery in this particular field. The surgical techniques for repair of atrial septal defects, coarctation of the aorta, pure pulmonary stenosis and Tetralogy of Fallot are discussed, with a comparison of the results achieved. This congress was held before the full development of hypothermia and artificial circulations, so that the great advances that have now become apparent cannot be discussed.

In the last section, the surgical treatment of non-congenital heart disease is discussed with the treatment of aortic and mitral stenosis as the main fields. Considerable advances have taken place since this meeting, but the volume contains much of historical interest.

V.S.

World Trends in Cardiology. Volume III. Blood Volume and Contractile Protein in Heart Muscle. Edited by Arthur S. Cain, Jr., M.D. Pp. viii + 131. 41 Figures. \$3.50. New York: Paul B. Hoeber, Inc. 1956.

Contents: Contributors. Foreword. *Part I. Blood Volume.* 1. Control of the Peripheral Circulation by the Walls of the Blood Vessels: The George E. Brown Memorial Lecture, by Alan C. Burton. 2. Factors that Determine the Rate of Venous Return to the Heart, by Arthur C. Guyton. 3. Physiological Aspects of the Regulation of Blood Volume, by Hampden C. Lawson. 4. Use of Different Dye Methods in Blood Volume Determination, by Ernst Wellheim. 5. Comparison between Different Radioactive Labeling Techniques for Measuring Red Cell Volume: The Use of Radioactive Chromium, by Seymour J. Gray. 6. Physiology and Clinical Application of the Isotope Technic in Blood Volume Determinations, by P. Wasser. 7. Residual Volume of Blood in the Right and Left Ventricle, by Robert F. Rushmer. *Part II. Contractile Protein in Heart Muscle.* 8. Introduction, by Maurice B. Visscher. 9. Three Revolutions in the Physiology of Contraction, by Wilfrid F. H. M. Mommaerts. 10. Significance of the Newer Knowledge of Contractile Proteins for Cardiology, by Richard J. Bing. Index.

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The first chapter is a review on the peripheral circulation and its control. The important principles involved in the veno-arterial reflexes are emphasized. Venous return to the heart is little understood and the difficulties are outlined. The measurement of blood volume is discussed by several workers in the field, who show how inaccurate our present-day methods are. This section of the book is completed by a discussion on residual blood volume in the ventricles. It has become more apparent that the normal stroke volume is achieved by comparatively inadequate emptying of the ventricles. The importance of residual blood volume, both in systole and diastole, is emphasized. An increased cardiac output is achieved not only by the increased venous return but also by more complete emptying of its chambers, as well as increased relaxation.

The volume ends with a brief discussion on the metabolism of muscle protein and the physicochemical structure of heart-muscle fibres. The direct effect of digitalis on the heart muscles is again emphasized.

V.S.

World Trends in Cardiology. Volume IV. Cardiovascular Diagnosis and Therapy. Edited by Arthur S. Cain, Jr., M.D. Pp. viii + 95, 8 Figures. \$3.85. New York: Paul B. Hoeber, Inc. 1956.

Contents: 1. Diagnosis and Management of Rheumatic Fever and Rheumatic Heart Disease: A Panel Discussion. T. Duckett Jones (Chairman), Maurice Campbell (Co-chairman), Edward F. Bland, Albert Dorfman, John D. Keith, Charles H. Rummelkamp, May Wilson. 2. Present Status of the Diagnosis of Phlebotomocytoma by Pharmacologic Methods, by Grace M. Roth, and Walter F. Kvale. 3. Diagnosis and Surgical Therapy for the Segmental Occlusion of the Major Arterial Supply, by Gerald H. Pratt. 4. The Treatment of Hypertension: A Panel Discussion. Irvine H. Page (Chairman), Edgar V. Allen, Stina Björk, Eduardo Braun-Menendez, George A. Pereira, F. Horace Smirk, Robert W. Wilkins. 5. Treatment of Coronary Heart Disease, by Robert L. Levy. 6. The Use of Anticoagulants for Myocardial Infarction, by Irving S. Wright. 7. Anticoagulant Therapy in Threatened and Established Myocardial Infarction, by Jean Levrigne. 8. Treatment of Shock in Myocardial Infarction, by E. Cowles Andrus. Index.

This volume begins with a discussion on rheumatic fever and rheumatic heart disease. All participants in the panel stress the reduction in the incidence of rheumatic fever and anticipate a similar reduction in rheumatic heart disease in the future. The methods of prophylaxis are well outlined.

In the next section an excellent discussion on the diagnosis of phlebotomocytoma is given, with the techniques adequately described. The diagnosis and surgical therapy for segmental occlusion of the major arterial supply follows, with the stress on the importance of aortic arteriography. The early work on artificial material for arterial transplants is outlined, but much progress has occurred in this sphere since this meeting.

The treatment of hypertension with the ganglion-blocking agents and rauwolfia compounds available at that time is well discussed. Nothing new emerges on the discussion of the treatment of coronary heart disease; the now-familiar emphasis on anticoagulants is again stressed, but no new contribution is offered.

V.S.

World Trends in Cardiology. Volume V. Instrumental Methods in Cardiac Diagnosis. Edited by Louis N. Katz, M.D. and Arthur S. Cain, Jr., M.D. Pp. x + 100, 11 Figures. \$3.85. New York: Paul B. Hoeber, Inc. 1956.

Contents: Contributors. Foreword. Part I. Diagnostic Instrumentation. 1. Diagnostic Instrumentation in Congenital Heart Lesions with Reduced Pulmonary Circulation, by Maurice Campbell. 2. Diagnostic Instrumentation in Congenital Heart Lesions with Increased Pulmonary Circulation, by Pierre Soulie. 3. Angiogrammetry, by F. Grosse-Brockhoff. 4. Indicator Substances in the Diagnosis of Congenital Heart Disease, by Howard B. Burchell. 5. Angiocardigraphy in Two Planes and with Multiple Frames, by John Lind. Part II. Memorials. 6. Frank Norman Wilson: Physician, Scholar, Friend, by Louis N. Katz. 7. The Fiftieth Anniversary of the String Galvanometer; Willem Einthoven, by H. A. Stellan. Part III. Electrocardiography and Ballistocardiography. 8. Vectorcardiography and Electrocardiography: A Discussion of Two Cases, by Louis N. Katz (Chairman), George Burch (Co-chairman), Charles Kossmann (Co-chairman), W. Den Boer, Pierre Duchosal, Arthur Grishman, Max Holzmann, I. K. Milovanovich, Gordon B. Myers, Vittorio Puddu, Marcel Segers, Demetrio Sisti-Pallares, Conger Williams, Louis Wolff. 9. Ballistocardiography: A Panel Discussion. Isaac Starr (Chairman), Benjamin Baker, Herbert R. Brown, Jr., Emile R. Harrison, Harry Mandelbaum, John L. Nickerson, Samuel A. Talbot, Wolf-Wito von Wittern.

In this, the last of the series, a few of the special methods of investigation are discussed. A disappointing discussion on cardiac catheterization is followed by a good review of dye-dilution methods used in the diagnosis of congenital heart disease.

The section on electrocardiography is of interest, comparing the interpretation of two electrocardiograms with the two vector cardiograms, but does not contribute anything to the knowledge of either. Ballistocardiography is reviewed by several of the workers in the field.

Like the preceding four volumes, this book is of historical interest only, commemorating an international cardiac meeting. It is of particular value to those members of the profession who were fortunate enough to attend the congress, but for the general medical public it holds little of real interest or of permanent importance.

V.S.

CORONARY OCCLUSION

The Pathogenesis of Coronary Occlusion. By A. D. Morgan, M.A., M.D. with a foreword by John H. Duguid, M.D. Pp. 171. 179 Figures. 42s. net. Oxford: Blackwell Scientific Publications. 1956.

Contents: Part One. A Historical Review. I. The Rising Incidence of Coronary Disease. II. Early Observations on Coronary Sclerosis. III. The German School of the Nineteenth Century. IV. Experimental Atherosclerosis. V. Fatty Streaking and Atherosclerosis. VI. Atherosclerosis and Coronary Thrombosis. VII. The Morphology of Coronary Occlusion. VIII. The Collateral Circulation of the Heart. IX. The Influence of Age and Stress. X. Cardiac Hypertrophy. Electrocardiography. XI. Duguid's Thrombogenic Hypothesis. XII. The Biochemical Approach. XIII. The Diet and Atherosclerosis. XIV. Inhibitory Factors. XV. Contributory Factors. XVI. The Statistical Approach. XVII. Local Pre-disposing Factors. Part Two. A Study of the Morphology of Coronary Occlusion. XVIII. Methods and Materials. XIX. Pathological Changes in the Adventitia and Media. XX. The Episodic Nature of Intimal Deposits. XXI. The Role of Intimal Vascularization and Haemorrhage. XXII. The Nature of Arterial Thrombosis. XXIII. Fibrin in Atherosclerotic Plaques. XXIV. Degeneration in the Plaque. XXV. The Relation of Coronary Occlusion to Myocardial Infarction. XXVI. The Coronary Arteries and the Rest of the Cardiovascular System. XXVII. Correlations. XXVIII. The Kidneys in Coronary Sclerosis. XXIX. Cardiac Weight in Coronary Sclerosis. XXX. Revaluations. XXXI. Conclusions. Appendix. Bibliography. Author Index. Subject Index.

To anybody interested in coronary atherosclerosis (and who is not nowadays?) this book can be heartily recommended. It is a study of the morbid histology of the coronary arteries in atheroma, with an attempt at elucidating the pathogenesis of this disease. A large series of cases is extensively studied by histological methods with a variety of staining techniques.

At the commencement of the study the author was not in agreement with Duguid's thrombogenic theory of coronary atheroma, but by the time he had completed his investigations he had become convinced of the correctness of the theory. The evidence presented throughout the book strongly supports this contention. In Part I a most interesting historical review is given of the pathology of coronary disease. The style is excellent and, as the story unfolds, the material is so well presented that it makes easy and enjoyable reading. The part played by Rokitsansky, Virchow, Klotz, Aschoff and Anitschkow is all outlined, with a brief survey of their experimental work and deductions. The review is brought up to date with the work of Leary, Schlesinger, Saphir and, ultimately, Duguid. The initial hypothesis of the cause of atheroma put forward by Rokitsansky was thrombosis of the artery with softening of the clot. This was attacked by Virchow and discredited, the condition being attributed to infiltration of the vessel wall by cholesterol and similar products. Leary later put forward histological proof of phagocytes entering the subintima, carrying cholesterol. The factors promoting and inhibiting the production of coronary atheroma are then analysed and brought up to date with the dietary studies at present in vogue.

Part II is concerned with the author's own histological findings on sectioning a series of coronary vessels, aortae and popliteal and brachial arteries. A large series of histological pictures is reproduced, illustrating the points excellently. In spite of the fact that the photographs are not in colour, the reproduction of the histological findings is excellent and can be followed even by the practitioner not specially skilled in morbid pathology.

The author has made a major contribution in the pathogenesis of coronary occlusion and has put forward strong evidence favouring the thrombotic causation of coronary atheroma.

V.S.

ANAEMIA AND THE ALIMENTARY TRACT

Anaemia and the Alimentary Tract: the Relationship between Changes in the Alimentary Tract and Deficiencies of Iron, Folic Acid and Vitamin B₁₂. Being an expanded version of the Sydney Watson Smith Lecture for the year 1955 delivered in the

Hall of the Royal College of Physicians of Edinburgh on 15th December. By L. J. Witts, M.A., D.M., M.D., Hon. Sc.D. (Dublin). Pp. 94. 19 Figures. 7s. 6d. Edinburgh: Royal College of Physicians of Edinburgh. 1956.

Contents: I. Some Links between the Blood-forming Organs and the Gastro-intestinal Tract. II. Lesions of the Mouth, Pharynx and Oesophagus in Anaemia. III. The Investigation of the Stomach and Intestine in Anaemia. IV. Changes in the Stomach and Intestine in Iron Deficiency. V. Classification of the Megaloblastic Anaemias. VI. Addisonian Pernicious Anaemia. VII. The Intestinal Megaloblastic Anaemias. VIII. Problems and Conclusions. Summary. References.

This is an expanded version of a lecture delivered to the Royal College of Physicians of Edinburgh in December, 1955. The scope of this booklet is defined in the subtitle 'The relationship between the changes in the alimentary tract and deficiencies of iron, folic acid and vitamin B₁₂.' Throughout the presentation the emphasis is on perspective, the technical details being avoided. Old and new problems are assessed in the light of information derived from the modern research techniques, including studies in radio-active iron, radio-active vitamin B₁₂ and gastric biopsy. The subject is presented with clarity and simplicity and will be an invaluable aid to readers unfamiliar with the advances in this sphere. To those who are interested in this subject the stimulating and thought provoking content merits attention. The booklet is indeed an impressive record of the research activities in Professor Witts's department at Oxford.

E.D.

WHO BULLETIN

Bulletin of the World Health Organization. Vol. 15, No. 1-2. Epidemiology. Pp. 359. 10s. Genève: World Health Organization. 1956.

Contents: Introduction. Trends of female mortality from cancer of the breast and cancer of the genital organs—M. Pascua. Poliomyelitis in 1954—A. M.-M. Payne & M.-J. Freyche. Accident mortality among children—S. Swaroop, R. M. Albrecht & B. Grab. La malnutrition protéique au Brésil—J. Waterlow & A. Vergara. Bilharziasis survey in British West and East Africa, Nyasaland, and the Rhodesias—Dyson M. Blair. Virus meningo-encephalitis in Slovenia: 4. Isolation of the virus from the ticks *Ixodes ricinus*—M. Likar & J. Kmet. The status of botulism as a world health problem—K. F. Meyer. Some viral and rickettsial infections in Bosnia and Herzegovina: a sero-epidemiological study—A. L. Terzin, J. Goan, M. Hadžić, H. Harlać & V. Hlaća. Endemic goitre and its prevention in Hungary—J. Sós, G. Szabó & A. Raksányi. Q fever in domestic and wild birds—L. Syruček & K. Raška. Some epidemiological aspects of poliomyelitis in Turkey: a serological survey for neutralizing and complement-fixing antibodies against polioviruses—Sabahattin Payzin.

Bulletin of the World Health Organization. Vol. 15, No. 3-4-5. Malaria. Pp. 862. 10s. Genève: World Health Organization. 1956.

Contents: Introduction. Theory of the eradication of malaria.—G. Macdonald. The significance of insecticide-resistant strains: with special reference to pests of medical importance.—J. R. Busvine. Susceptibility of malaria vectors to DDT in Greece: laboratory findings.—Gregory A. Livadas and Kyriacos Thymakis. Resistance of anopheline larvae to chlordane and dieldrin: field and laboratory tests on *Anopheles sacharovi*.—George D. Belios and George Fameliaris. Etude cytogénétique d'*Anopheles gambiae*.—G. Frizzi & M. Holstein. The problem of exophily in *Anopheles maghiae*.—M. T. Gillies. A new character for the recognition of nulliparous females of *Anopheles gambiae*.—M. T. Gillies. Biological variations in *Anopheles darlingi* and *Anopheles gambiae*: their effect on practical malaria control in the neotropical region.—G. Giordani. Identification of blood meals of blood-sucking arthropods.—B. Weitz. Radioisotopes for research on and control of mosquitoes.—Leonard J. Bruce-Chwatt. Biometric study of spleen and liver-weights in Africans and Europeans, with special reference to endemic malaria.—Leonard J. Bruce-Chwatt. Observations sur la répartition et le comportement des anophèles de l'Afrique-Equatoriale Française, du Cameroun et de l'Afrique Occidentale.—J. Hamon, J. P. Adam and A. Gréberine. Aperçu sommaire du peuplement anophelin de Madagascar.—Alexis Gréberine. Epidemiological basis of malaria control.—G. Macdonald. La lutte contre le paludisme en Afrique tropicale.—P. M. Barnard. Spleens and holoendemic malaria in

West New Guinea.—D. Metselaar. Malaria in Sarawak and Brunei.—Julien de Zulueta and Francois Lachance. Malaria in south-western and north-western Nigerian communities.—H. Munro Archibald. La lutte contre le paludisme à Madagascar.—G. Joncour. Le paludisme en Roumanie de 1949 à 1955.—M. Ciuca. Le paludisme en Yougoslavie.—C. Simic. La prophylaxie antipaludique au Maroc par administration mensuelle de divers médicaments.—Guy Hourcade. Suppression of malaria with pyrimethamine in Nigerian school children.—H. Munro Archibald and Leonard J. Bruce-Chwatt. Notes.

These are the 1956 numbers of the Bulletin, in which are reviewed the data made available to the World Health Organization.

The articles are authoritative and well put forward, the data clean and easily extracted and the style and format of the quality one has learned to expect from this international organization.

RADIATION

Strahlendosis und Strahlenwirkung. Tafeln und Erläuterungen unterlagen für den Strahlenschutz. Second Edition. By B. Rajewsky. Pp. xvi + 364 + 104 Tables. DM 36.-. Stuttgart: Georg Thieme Verlag. 1956.

Contents: Teil A. Einführung und Erläuterungen zu den Tafeln (1-84 seite). Teil B. Tafeln (104). Teil C. Bibliographie (1-280). Abschnitt. I. Strahlungen. Strahlenreaktionen und Strahlenschädigungen. II. Die akute Strahlenkrankheit. III. Einmalige kurzzeitige Ganzkörperbestrahlung. IV. Bedeutung der zeitlichen Dosisverteilung (Zeitfaktor). V. Dauerbestrahlung—höchstzulässige Dosen. VI. Teilkörperbestrahlung. VII. Strahlenreaktionen der Organe. VIII. Blut und Blutbildungsorgane. IX. Strahlenkrebs. X. Genetische Strahlenwirkungen. XI. Die relative biologische Wirksamkeit der verschiedenen Arten ionisierender Strahlen (R.B.W.). XII. Zulässige Mengen radioaktiver Isotope im menschlichen Körper. XIII. Erklärung und Definition der gebräuchlichen radiologischen Einheiten und Abkürzungen. XIV. Atombomben-explosionen.

The opening up of the field of atomic energy in the last 20 years has brought problems that greatly affect the future of humanity. To the scientists engaged in nuclear research the far-reaching importance of these studies has been obvious for more than half a century. To the public generally their terrifying significance has become apparent only since the ghastly effects of atomic bomb explosions became known.

The consequences that would result from the use of atomic weapons in war are so shocking that the average man scarcely realizes the immense benefits to mankind that are certain to be derived from the availability of nuclear energy. In fact, the present developments in the application of this form of energy for industrial purposes has come just in time to save the world from starvation, once the expendable sources of energy on which the life of the world now depends became exhausted.

These technical developments, however, bring with them grave dangers of exposure to radiation, from which not only the workers in atomic plants but also the public must be protected. To enable authorities and organizations engaged in this work to prevent such dangers and to counteract such ill-effects as may occur, detailed knowledge of these is required. It will be necessary to train specialists capable of giving advice on the many problems involved.

The work of Rajewsky and his collaborators at the Max Planck Institute for Biophysics at Frankfurt a.M., presents us with a tabulation of the scientific data on these matters available at the present time. The first edition, published in September 1954, was exhausted in a few months, and the present is a greatly enlarged version of the first. In addition to many tables and diagrams it gives a list of some 7,000 publications from all over the world. It is the author's intention to keep this work up to date by subsequent editions and thus to provide us with a continual compilation of all the information available on the subject.

No authority or organization responsible for atomic-energy projects can afford to be without this authoritative work.

J.v.R.

CORRESPONDENCE : BRIEWERUBRIEK

'ILEOSTOMISTS'

To the Editor: Last week at a small meeting of 'Ileostomists', (persons with a permanent ileostomy) it was unanimously decided to form ourselves into a club affiliated to the Q.T. of Great Britain.

Through the doctors we hope to contact other 'Ileostomists' who might like to join our club. We would appreciate it if in the next convenient issue of the *South African Medical Journal* you

would make an announcement of this, and ask doctors interested or patients concerned to contact the Secretary, Miss J. N. Jarvis, 150 Langermann Drive, Kensington, Johannesburg; telephone 25-2575.

150 Langermann Drive
Kensington
Johannesburg
28 June 1957.

J. N. Jarvis
Secretary

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